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# Educational Use Of Social Media: Exploring Science and Engineering College Students' Perceptions about Utilizing Facebook to Enhance the Learning of Physics

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EDUCATIONAL USE OF SOCIAL MEDIA: EXPLORING SCIENCE AND ENGINEERING  
COLLEGE STUDENTS' PERCEPTIONS ABOUT UTILIZING FACEBOOK TO ENHANCE  
THE LEARNING OF PHYSICS

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Dean of the Graduate School

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## **Dedication**

I would like to dedicate this thesis project to my wife and children for their perseverance, support, and love throughout my educational journey.

EDUCATIONAL USE OF SOCIAL MEDIA: EXPLORING SCIENCE AND  
ENGINEERING STUDENTS' PERCEPTIONS OF UTILIZING FACEBOOK  
ON THE LEARNING OF PHYSICS

by

ANGEL S. MARQUEZ JR., BS in Mathematics, MAT Science

THESIS

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## **Abstract**

The aim of this qualitative investigation is to explore a group of science and engineering students' perceptions about utilizing Facebook to enhance the learning of physics. Particularly, a survey composed of multiple choice and open-ended questions was employed as to obtain participants' reactions on a proposed scenario where Facebook is utilized in an Introductory Classical Mechanics course as the medium to manage the following academic activities throughout the semester: examinations, class preparations, study guides, homework assignments, lab preparations, creating group studies, and class participation dynamics. Out of the 120 potential candidates, 106 of them accepted to voluntarily participate in this investigation. After the analysis of the data concluded, it was found that, on average, 69% of the students reported to have a positive view about the hypothetical implementation of Facebook to mediate their learning in such an introductory physics class at the University of Texas at El Paso. The remaining 31% of participants simply expressed their lack of interest about this particular educational use of Facebook.

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# EDUCATIONAL USE OF SOCIAL MEDIA: Exploring Science and Engineering Students' Perceptions of Utilizing Facebook on the Learning of Physics

## Chapter 1: Background Information

### 1.1 Introduction

As shown by Lenhart (2010), 77% of teens reported that they contacted their friends daily via text messaging<sup>1</sup>, and 33% did so via social network<sup>2</sup> systems. Moreover, statistics from Facebook<sup>3</sup>, which as of June 2011 had over 500 million members, reported that over 50% of the users logged in a daily basis (Facebook, 2011). According to Facebook's own statistics, over 250 million individuals accessed Facebook through a mobile device<sup>4</sup>. Furthermore, Facebook interactions through such mobile devices doubled in relation to the non-mobile counterpart (Facebook, 2011, p. 1). In essence, due to the popularity and versatility of social media communication, particularly Facebook, among millennial generation of college students, it would be an asset to consider the integration of such a social network into higher educational institutions' academic curricula, as recommended by Arteaga Sánchez, Cortijo, & Javed (2014) in their discussion regarding the prediction of college students' adoption of Facebook being mainly attributed to Social Influence<sup>5</sup> and building or maintaining contact with other people with whom they share interests. The pedagogical potential of the inclusion of Facebook into such programs of study would be greatly maximized by exploiting the substantial ownership and accessibility of mobile devices, as shown by Scornavacca, Huff, & Marshall (2009) in their

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<sup>1</sup> Refer to glossary for definition on text messaging.

<sup>2</sup> Refer to glossary for definition on social network.

<sup>3</sup> Refer to glossary for definition on Facebook.

<sup>4</sup> Refer to glossary for definition on mobile device.

<sup>5</sup> Refer to glossary for definition on Social Influence.

findings on the implementation of the Short-Message-Services (SMS)<sup>6</sup> tools on mobile phones to increase interactivity in particularly large college level courses.

## **1.2 Gap of the Study**

After examining the review of the literature, it was noticed that the number of studies exploring the educational use of social media is insufficient. Moreover, the available investigations fail to examine the utilization of Facebook to enhance the learning of classical mechanistic concepts<sup>7</sup>. Furthermore, there was no existing literature concerning the study of the implementation of Facebook in relatively large introductory physics courses.

## **1.3 Purpose of the Study**

Unsurprisingly, the features of technological innovations play a vital role in today's social interactions. Thus, the inspiration of the study was incited by the idea that the construction of learning must be aligned to students' present reality, as effusively proclaimed by Gruenewald (2003) in his intellectual analysis pertaining to how critical pedagogies<sup>8</sup> originated from creating awareness about one's position in time and space, not only geographically, but with respect to political, social, and economic individuals' realities.

Moreover, due to the collaboration factor intrinsically occurring during social media interactions, it is the aim of this investigation to examine a group of science and engineering college students' perceptions on their academic engagement being affected by the proposed scenario where Facebook is utilized to manage the academic curriculum of two Introductory

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<sup>6</sup> Refer to glossary for definition on Short-Message-Service.

<sup>7</sup> Refer to glossary for definition on classical mechanics.

<sup>8</sup> Refer to glossary for definition on critical pedagogy.

Mechanics courses. In essence, since the process of learning is socially constructed, as stated by social constructivists learning theories<sup>9</sup>, and communication through social media is characterized by abundant collaborative dynamical interactions, it is suspected that the learning of classical mechanistic principles would be substantially enriched by the employment of Facebook as the principal medium to operationalize the curriculum of such a physics course by facilitating the collective inter-communication during the execution of every academic activity taking place throughout the semester.

#### **1.4 Researcher's Background**

During the principal investigator's journey as a graduate student in the Physics Department at the University of Texas at El Paso, he was fortunate enough to work as a Teaching Assistant (TA) and Lab Instructor for ten semesters in the Introductory Mechanics and Astronomy courses. It was during the mentioned teaching experience that he began noticing the influence of technological innovations on the construction of learning about physics concepts. That is to say, the principal investigator for this thesis project was astonished as he observed students obtaining graphical information about resolving classical mechanistic concepts on their mobile devices. Thus, students enrolled in these introductory physics courses would manage to find webpages and mobile applications<sup>10</sup> such that by inputting a couple of words or a simple physics algorithm pertaining to a given physics problem, they would obtain a complete set of instructions, including pictures and derivations, on how to approach and manage to work the problem out. On the other hand, during his experience proctoring examinations, he observed students illicitly invoking the help of classmates or other individuals with physics expertise

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<sup>9</sup> Refer to glossary for definition of social constructivism.

<sup>10</sup> Refer to glossary for definition of mobile applications.

through the features of social media communication. Moreover, author of this thesis project holds unpleasant memories about students not paying attention to his lectures because of their profound immersion in the realms of virtual socialization or game playing activities through their mobile devices. In essence, it was such an indisputable and popular presence of such technological instruments within the classroom settings that ignited the principal investigator's inquisitiveness about exploring the pedagogical impacts of systematically integrating social media into the Introductory Mechanics courses' academic curriculum.

## **1.5 Literature Review**

After the exploration of the collaborative and interactive learning dynamism exemplified in the bodies of literature pertaining to the utilization of social media for academic purposes has concluded, the following themes emerged: Implementing social networks in formal academic curricula; limitations and caution regarding the adaptation of social media in academia; and the use of social media to facilitate the learning outside the classroom environment.

**1.5.1 Implementing social networks in formal academic curricula.** As investigated by Jacobsen & Forste (2011) in their exploration of the correlation between first-year college students and academic performance, it was found that the students' interaction with social networking and cell phones<sup>11</sup>, in general, is directly associated with an increase in individuals' ability to engage into face-to-face- social interactions, which are indispensable features, according to social constructivist learning theories, required for an optimal functionality of the classroom participatory dynamism (p. 275).

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<sup>11</sup> Refer to glossary for definition on cell phone.

In regards to the use of social media in university curricula, Donlan (2014) investigated students' perceptions pertaining to the implementation of Facebook in sport-related courses. After the analysis of the data obtained from a survey, it was found that out of the 112 participants (which majority of students' ages ranged from 18 to 21 at the time of the study), 95% of this sample reported that Facebook was their social network of choice. Moreover, there was no significant difference between female and male participants on the mentioned preference. Also, as described by Donlan (2014), 88% of the university students expressed to be interested or very interested in the utilization of Facebook in academic endeavors: specifically, 84% of them showed to be interested or very interested in interacting with their professors via the Facebook messenger; 86% reported their motivation for utilizing Facebook for the purpose of discussing the course content-related issues with other classmates; 90% reported their interest in accessing links, through their Facebook account, containing articles which supported the course material; and, 87% of them reported their motivation for receiving messages from professors, through the Facebook account, regarding updates about the course-related issues (p. 577). Continuing with the analysis of social media employed as learning tools within the classroom settings, Balakrishnan (2014) documented students' positive views regarding the potential pedagogical benefits of social media. Thus, it was discovered that the accessibility to social networks in academic settings, convenient use of social networks for collaborative purposes, and familiarity with such technological innovations were crucial factors in identifying the multiple academic advantages to the teaching and learning dynamics in post-secondary settings. It was further discovered that both faculty and students agreed on the benefits of social media when used as a didactical tool. Furthermore, after recording the students and lecturers' perceptions on the



applicability of social media, the results of the study revealed that integrating YouTube<sup>12</sup>, Facebook, and Twitter<sup>13</sup> maximized the students' academic engagement and professors' feasibility to implement the academic curriculum (p. 602). Continuing with the evaluation of Facebook for academic purposes, Baran (2010), in his investigation with undergraduate students from the University of Dokuz Eylul at Turkey, reported that participants communicated their interest in utilizing Facebook as a tool to facilitate the teaching and learning duality. Specifically, it was stated that such a sample of students had a positive attitude toward the didactical implementation of Facebook as to enhance the student-teacher and student-student interactive collaboration and relationship in general. Furthermore, students in this study recommended the integration of Facebook in formal academic curricula. Similarly, Miron & Ravid (2015) reported the participants' positive attitudes about the implementation of Facebook as the medium to enhance the learning construction. Thus, the professors' fascination about the easiness of student-teacher communication through Facebook was particularly acknowledged. In taking advantage of the ever-increasing popularity of social media, Abe & Jordan (2013) recommend that the success of the integration of social media into the academic curricula depended on the students' critical and intentional use of it. The investigators further remarked the efficacy of Facebook in connecting with students and enhancing class participation. In general, the investigation suggested that social media could serve an excellent pedagogical agent for enhancing class collaboration and students' academic engagement.

Now, as it pertains to the integration of social media in high school level science courses, (Rap & Blonder, 2016) examined the utilization of Facebook as the principal medium to

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<sup>12</sup> Refer to glossary for definition of YouTube.

<sup>13</sup> Refer to glossary for definition of Twitter.

construct learning about chemistry curriculum in 11<sup>th</sup> and 12<sup>th</sup> grades. Thus, it was observed that 47% of collaborative activities among students in the same chemistry class, through Facebook, revolved around homework assignments and course content material, and 22% of the posting on Facebook involved text and hyperlinks<sup>14</sup> about chemistry-learning. In essence, after the results of the data analysis were obtained, it was concluded that Facebook represents a potential academic tool for instructors in enhancing students' learning about chemistry principles (p. 62). Exploring the infusion of social media into university science curricula, Whittaker, Howarth, & Lymn (2014) reported the academic impacts of utilizing Facebook to create learning communities in an Animal Science class. Thus, the investigation's analysis revealed that, as a result of interacting through Facebook, the 42 participants in the study established more effective collaboration skills during the learning process, particularly on problem-solving strategies. As further mentioned by the investigators, the advantages of using Facebook to enhance the learning were notoriously maximized when a mobile device mediated the operationalization of such academic activities. Additionally, in studying college students' online-discussions in a Disease Management course, DiVall & Kirwin (2012) discovered that the 119 participants who interacted with faculty and classmates on class material content expressed their preference for using Facebook over Blackboard Course Management System<sup>15</sup>. Thus, this sample of students found Facebook to be helpful in enhancing their learning. Moreover, the mentioned participants enthusiastically recommended the didactical implementation Facebook in sequential courses. In essence, participants found Facebook to be very valuable and a substantial facilitator during their comprehension about disease management literature. Recognizing the massive participation of post-secondary health science students in social media, King, Greidanus, Carbonaro, Drummond,

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<sup>14</sup> Refer to glossary for definition of hyperlink.

<sup>15</sup> Refer to glossary for definition of Blackboard Course Management System.

& Patterson (2009), after the analysis of the data, discovered the effectiveness of social networking environments in facilitating the creation of learning communities. Thus, researchers further emphasized the importance of such social media interaction in facilitating the learning through inter-professional group collaboration activities, and the accessibility to class material. As investigated by George, Dreibelbis, & Aumiller (2013) in their study with 154 students enrolled in a Health Science course, the students' participation during lectures was significantly improved by the incorporation of two social networks, Google Docs and SurveyMonkey. Thus, the analysis of the data further revealed that the utilization of social networks, as a medium to promote interactive learning during lectures, provided students with the opportunity of becoming co-creators in their own learning. As similarly revealed by Junco, Heiberger, & Loken (2011) in their investigation with 125 pre-health first-year college students, participants asked to use Twitter for academic purposes in their classes obtained higher grades and greater academic engagement than the students not utilizing Twitter for academic purposes (control group).

As in invoking the power of social media in online class curricula, Aubry (2013), in his investigation with 104 participants enrolled in an online French course for one semester in a major U.S. four-year higher educational institution, discovered that the students with access to the instructor's profile on Facebook (biographical information, photos, and other personal information) showed a significant positive shift in their academic motivation, as measured by a pre and post-test. In another college level course on linguistics, Po-chi & Craigie (2014) reported that, in their investigation with 164 students learning English as a second language at a Taiwanese university, there was a significant positive correlation between participants' English usage on Facebook and their academic achievement in such an English course (p. 21).

Additionally, in a similar investigation on the utilization social media features within virtual learning contexts, Maiden (2010) observed that the adaptation of social work education to digital environments via chatting, virtual live discussions, emails, and synchronous students' interactions through webcams, resulted in a pleasant teaching experience, full of academic engagement, collaborative learning, and the development of a uniquely personalized relationship with students, contradictory to the notions of student-teacher's intimate connection being accomplished only within the realms of the physical classroom settings (p. 610). Continuing with the analysis of the use of social media for mediating the learning about linguistic content, Warhol (2014) accidentally discovered the pedagogical impact of utilizing Facebook to teach international relations material to a group of intermediate-English speaking students. Such teaching and learning dynamics consisted of students posting and discussing about cartoons and other graphical models on political issues, variety of currency, and trading issues. Moreover, at the end of the course, it was found that students significantly improved their writing communications skills in English. Furthermore, Facebook served as the medium to facilitate the fluency of ideas on international relations, regardless of the students' linguistic deficiencies.

On exploiting the unprecedented popularity of social media, Faulds & Mangold (2014) elaborated on the pedagogical benefits and business innovativeness of designing and implementing a course on the marketing principles of social media. It was further exposed that university students participating in such a unique marketing course, commanded through the integration of multiple social networks, discovered inedited marketing strategies, enhanced their learning through interactive collaborative activities, and significantly incremented their written, oral, and critical thinking capacities. Yeona found out that university students enrolled in

Business Management courses have a positive attitude towards utilizing Facebook to facilitate the collaborative learning through interactive activities. Thus, as mentioned by the millennial participants having grown up in a technological environment where human inter-communication has been normalized in the context of social media, convenience was the influential factor in determining the use of Facebook to enhance the students' academic engagement through such a collaborative learning model of instruction (2014). In taking advantage of the impacts of social media communication in every social institution, Arquero & Romero-Frías (2013), in their investigation with 105 business students participating in the Ning social network platform, uncovered the following pedagogical facts: such a sample of students significantly improved their academic engagement with business content; the students actively participating through the course's social network displayed an improvement on their academic performance in comparison with the participants with low interaction; the majority of students reported that because of the implementation of such a social network, they were more motivated to learn the class-related material; and, students appreciated the easiness of communicating with faculty through the mentioned social network.

In exploring the efficacy of the implementation of social media into higher education, Tay & Allen (2011) discovered that, based on the social media's intrinsic communication modality, such collaborative technologies are indispensable in promoting constructivist learning spaces. Thus, it was suggested in the study that the fusion of adequate assessment strategies and social media interaction is the key to an effective collaborative learning in formal educational settings. It is not uncommon to observe millennial generation of college students using their mobile devices for participating in social network interactions during lecture sessions. Thus,

Galagan pointed out that university professors who took advantage of such of interactive dynamics discovered that it did not take much effort or time before students began discussing course-related material through Twitter and blogging<sup>16</sup>. Moreover, the article elaborated on the pedagogical benefits of the use of social media to post material for preparing students for lectures and uploading quizzes about course content. Furthermore, the use of technology during lectures provided students with the opportunity of taking more control of their own learning (2010). As investigated by Junco, Elavsky, & Heiberger (2013), students who utilized Twitter as the medium to enhance their academic learning were reported to have higher grades than the students assigned to the control group. Thus, such academic achievement of students utilizing Twitter for academic purposes was significantly attributed to the participants' engagement and motivation to be actively involved in interactive conversations about the course content, and completing the course assignments on a timely basis via Twitter. Furthermore, Blair (2013) elaborated on the academic benefits of using Twitter in a Politics and International Relations university course. Particularly, the intellectual analysis in the article suggested that Twitter may be used for providing instantaneous clarification on students' concerns, update information on assignments' deadlines, promoting discussions about assigned reading, getting the students motivated to engage with leading professional in their field of study, and supporting class-related discussions among students during and outside the lecture session. Taking advantage of Facebook's popularity, Alexander & Sapra (2013), in their analysis of the educational implementation of Facebook in Gender and Women's Traditional Studies classes at Saint Mary's college, documented the following educational facts: participants' elaborated on the benefits and feasibility of posting class-related material, particularly real-life examples and stories, on

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<sup>16</sup> Refer to the glossary for definition of blogging.

Facebook's wall; participants further appreciated the importance of Facebook in making the connection between class material and media events; such posting modality through Facebook provided students with a deeper understanding on current masculinity issues presented in popular media; Facebook served as to clarify the material covered in class; students found a great deal of value in such an interactive modality leading to collaborative learning approach within the realms of a feminist theoretical framework; Facebook served as the medium to develop students' critical thinking; additionally, participants expressed their positive attitude towards Facebook for helping them with the preparation for class discussions. It was further described the potential of Facebook in propagating, promoting, and engaging students in Feminist perspectives and activism in regards to issues on social inequality, rape culture, and reproductive justice (2013).

**1.5.2 Limitations and caution regarding the adaptation of social media in academia.** As mentioned by (Davis III, Deil-Amen, Rios-Aguilar, & González Canché, 2015), in their analysis of data collected from articles, books, and several other electronic sources over a period of seven years (2005-2012), there exists a significant number of studies on the use of social media in higher educational institutions. However, only a relatively small percentage of such investigations are intended to explore the correlation between the utilization of social media technology as a didactical tool and students' academic performance (p. 413). Additionally, as described by Davis III et al., in their investigation pertaining the use of social media by community colleges, Facebook and Twitter were used mostly for administrative purposes (one-way communication, institution to students but not the other way around), specifically for sending messages to students about upcoming events, recruitment and marketing purposes, and emergency alerts. Yet, only a small fraction of the mentioned two-year post-secondary

institutions were found to dedicate the potential of such social network technologies to inquiry about students' concerns. Moreover, only a few of those colleges recognized the academic potential embedded in the interaction with such social media (p. 415).

As mentioned by Wilson, Wright, Inman, & Matherson (2011), in their intellectual analysis on the necessity to implement technological tools into the classroom, parallel to the rapid increase of technological innovations, the millennial generation of students adopted unique ways of reading and communicating in general. Thus, the social studies classroom must incorporate elements of Web 2.0 technologies<sup>17</sup> such as blogs, wikis<sup>18</sup>, and video sharing, as to merge the academic curriculum with students' social reality. As further recommended by DePietro (2012), it is through the use digital devices in the classroom that students are given the opportunity to be co-creators, along with instructors, of their own learning. Thus, in so doing, students operate within the framework of a participatory pedagogical model which offers a continuum inclusive interactive engagement throughout the lecture session. However, special boundaries must be generated so that the mentioned technological tools are only used for mediating the participants' learning. As pointed out by Soomro, Kale, & Yousuf Zai (2014), millennial students and college instructors' familiarity with and accessibility to social media technology are indisputable indicatives of the tremendous pedagogical potential embedded in such digital spaces. Thus, in their investigation with Pakistani student teachers and student teacher educators, it was found that the frequency of the participants' social media utilization was correlated with their motivation in using Facebook for didactical purposes during their academic journeys. Moreover, as opposed to pre-service teachers' faculty, student teachers in

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<sup>17</sup> Refer to glossary for definition on Web 2.0 technologies.

<sup>18</sup> Refer to glossary for definition of wikis.



the study expressed their intentions and appreciation towards using Facebook as the medium to promote the collaborative learning<sup>19</sup> phenomenon (p. 289). Additionally, Mancabelli (2012) suggested utilizing the power of technological innovations to eradicate the obsolete instructional paradigms. It was further recommended that social media may be one of such educational technologies dictating the future of academic curricula in the 21st century. However, the educators' proper training with such digital tools is of the essence.

As cleverly interpreted by Dyson, Vickers, Turtle, Cowan, & Tassone (2015), in today's digitalized world, the social interaction through Facebook by the majority of college students and faculty is an undeniable fact and irreversible process. Thus, after the analysis of the investigation performed on an Introductory Psychology course, it was found that integrating Facebook into the class lectures was not a trivial accomplishment, since the level of students' academic engagement was a function of the participants' attitudes towards utilizing such a social network for academic purposes. As reported by Lin, Hoffman, & Borengasser (2013), in their study with graduate and undergraduate students, participants expressed their enjoyment in sharing academic information through Twitter. However, over the course of the study, the interaction among students about class-related issues was predominantly deficient. Moreover, it was further suggested that, due to privacy concerns, participants displayed some resilience when asked to unconditionally utilize Twitter as a formal educational learning tool.

Concerning the implementation of technology into K-12 schooling, Hoffman, (2011) argued that it is the role of teachers, principals, and district administrators to focus their attention

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<sup>19</sup> Refer to glossary for definition of collaborative learning.

on how to take control of the safety issues, products, and services emerging from the execution of a digitalized curriculum, since it is inevitable to prevent the mapping of social networks communications with academic endeavors. In regards to the adverse impacts on the abuse of digital technological innovations, and as reported in *Diverse: Issues in Higher Education* (N.A., 2013, May), an investigation with female freshmen college students revealed that such a sample of participants was involved in text messaging, navigating the internet, and listening to music for about 12 hours a day. Thus, their choice of being immersed into such digital realities was proven to be negatively correlated with their academic performance. Similarly discovered in Junco & Chickering (2010), the implementation of Twitter into academic curricula was significantly correlated to the improvement of a sample of first-year college students' academic performance. However, since the convergence of academia with social media technologies is an unpreventable event, the investigators further suggested the creation of policies and regulations which diminish the risk of promoting unhealthy social interactions through such social networks in educational spaces. In continuing with the examination of social media in higher institutional spaces, Rowe (2014) elaborated on how social media has irreversibly reinvented every aspect of social communication. Thus, parallel to the incomparable accessibility and versatility of social media technology, a movement on undesirable behavior has emerged: the cheating and other forms of academic dishonesty are easily executed and propagated through social media interaction; and violent threats, racial and other discriminatory views about faculty and students, through social media, are prolifically reported to university administrators. Furthermore, Wynn (2013) found out that students in fact do appreciate the incorporation of such educational technologies, particularly those with a visual representation. However, as further reported by the study's participants, it is imperative to reach a consensus of students' technology of choice before its

formal incorporation into the academic curriculum. In another study on the possible impacts associated with the utilization of social media for educational purposes, Efe discovered that, in the investigation with 146 science student-teachers from Dicle University in Turkish, gender was not a significant factor in determining the potential correlation between computer self-efficacy and the use of social networks for educational purposes among the study's sample of pre-service science teachers. On the other hand, the students' major significantly influenced student-teachers' computer self-efficacy and the utilization of social networks for academic purposes. Additionally, an increase in students' self-efficacy pertaining to Web 2.0 technologies led to an increase in the utilization of social networks for educational purposes (2015).

### **1.5.3 The use of social media to facilitate the learning outside the classroom environment.**

According to Aksal, Gazi, & Bahçelerli, the increased popularity of computer mediated communication demanded the higher educational institutions' serious considerations for its applicability in academic endeavors. Thus, after the analysis of the data collected from the thirty-five college students participating in the study over the course of one semester, it was reported that after utilizing Facebook as the medium to command the curriculum in an internship course, students displayed and adopted the adequate leadership, self-reflection, and decision-making skills needed for an experiential internship environment, as explored within the theoretical framework encompassed by connectivist theories of learning<sup>20</sup>. It was further revealed by the analysis of the study that a Facebook-mediated internship course curriculum promoted a space for intellectual discussions and negotiations outside the typical lecture setting (2013). Pimmer, Linxen, & Gröhbiel discovered that nearly the majority of participants in the sample consisting

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<sup>20</sup> Refer to glossary for definition of connectivism.

of 30 medical students and 10 medical faculty members from the country of Nepal, expressed their choice for accessing Facebook through their cell phones for inquiring about topics relevant to their profession in a daily basis. Specifically, the mentioned participants elaborated on their involvement in group discussions, through Facebook, about medical and clinical topics even with health professionals from other countries. Moreover, the study's results indicated that Facebook's wall was the space where participants interacted with other medical professionals about quiz questions covering a wide range of medical topics. Furthermore, it was recognized that Facebook was being used by participants to access links about medical/clinical e-books and videos. In essence, the findings of this study illustrated the utilization of Facebook as the medium to enhance the learning on medical issues in informal educational settings (2012).

In continuing with the exploration on the importance and implications of social media interaction among university students, Pribeanu, Balog, Lamanauskas, & Šlekienė (2015) discovered that the majority of the participants in the study who utilized Facebook reported to be stimulated to try new adventures, being curious about other people's ideas, and being concerned about all aspect related to the university in general. Particularly, it was found that such active and continuous interaction through Facebook enhanced students' desirability to socialize with other students. When it comes to examining the impacts of social media on the emotional aspects of human relationships, C. (2013) found out that students' level of technological expertise had a significant impact on their perceptions about emotional affections among friends. Thus, individuals who actively interacted in more than one but less than five social networks displayed a tendency to develop a higher level of emotional connection within their humanistic social relations. Furthermore, participants' level of affection towards other people was

notoriously increased when interacting through Skype<sup>21</sup> face-to-face communication. As investigated by Wang, Hsieh, & Song (2012) in their study with 247 Chinese university students, a perceived social presence, perceived usefulness, and perceived enjoyment were crucial factors influencing the users' satisfaction during instant-text messaging<sup>22</sup> interactions. In an investigation with a sample of graduate students, Völjartaga & Fiedler (2009) reported the pedagogical benefits of incorporating certain constituents of social network technologies as to enhance the participants' ability to perform self-directed intentional learning projects. Thus, throughout the course of the study, students developed a great deal of technological proficiency which can be applied in multiple professional settings.

In regards to the efficiency of managing administrative and academic-related issues in higher educational institutions through the realms of social media communication, Herndon (2011) elaborated on the incomparable way of addressing the needs of a much higher population of college students, yet reducing the financial and other indispensable resources. Additionally, the data analysis suggested that employing particular features of social media technologies had the potential to improve the efficiency of academic counseling dynamics and career guidance for both prospective and current students. In continuing with the intellectual analysis on the indispensability of exploiting the potential of social media communication, Moltenbrey (2014) examined the latent benefits of the incorporation Facebook into academic curricula at the School of Visual Arts (SVA). It was further revealed that Facebook may serve as the ideal space for sharing academic work among students. Thus, the student-faculty interaction was effortlessly accomplished through such social network participation. Additionally, social media represents

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<sup>21</sup> Refer to glossary for definition of Skype.

<sup>22</sup> Refer to glossary for definition of instant-text messaging.

an ideal space for making contact with potential employers and empowering students' career in general, as mentioned in the article. Wilson (2013) discussed the importance of recognizing the pedagogical benefits emerging from the intersection between social media and academic curricula in higher educational institutions. Particularly the intellectual examination suggested that YouTube was among the most efficient teaching tools. Thus, YouTube may serve as the medium to recruit students for the course, as mentioned by a college professor.

As reported in Lawrence (2015), millennial generation of college students has grown up in a digital culture where multitasking and time-efficiency are the norms. Thus, it is crucial for universities to adapt their academic curricula to such characteristics of today's digital era. Likewise, Stephens (2011) illustrated that it is becoming a standard approach that college students are rarely relying on librarians when conducting a research project for academic purposes. Thus, it was found that when structuring such a research report, a significant number of students were invoking the versatility of social media, particularly Facebook. Therefore, the article recommended that library data bases must embrace the features of social media communication as to merge with the domains of today's virtual socialization.

As documented by Carton, Twitter has gained a tremendous popularity among teachers, and educators in general. Such professionals in the field of education are utilizing Twitter as to keep up with the latest information on their field. Because of the nature of such a social network, participants are forced to exclude interactions about their intimate and non-professional personal lives, as mentioned by one teacher. In essence, educators are twitting<sup>23</sup> and retwitting innovative pedagogical ideas which help them with their class lessons and delivery of academic curriculum

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<sup>23</sup> Refer to glossary for information of twitting.

in general. Through Twitter, teachers have the option of choosing the professional experts they wish to follow (2014). Furthermore, as discussed in Ynjälä, Häkkinen, & Hämäläinen, social media may serve as the ideal medium to enhance every element of workplace learning: situated, social, collaborative, and experiential learning, among others. Thus, social media may be very effective in creating unique professional development and learning environments in the work place. In essence, the specific collaborative attributes of social network communications, through facilitating the sharing of ideas about projects, results intrinsically suitable for corporations to establish the platform so that the acquisition of knowledge becomes a socio-cultural activity (2014).

## **Chapter 2: Methodology**

### **2.1 Study Design**

In exploring the college students' perceptions about the hypothetical utilization of Facebook for educational purposes, the investigation was conducted through the rigors of a qualitative methodology approach. Particularly, out of 120 potential participants, 106 college students enrolled in two Introductory Classical Mechanics courses (PHY 2420 for engineers and PHY 2420 for physics majors, Spring 2016) at the University of Texas at El Paso agreed to voluntarily take part in the study. Such a sample of students consisted of 106 sophomore and junior students majored in science and engineering, thus, the PHY 2420 course is a requirement for the core curricula of the mentioned academic majors. Moreover, the mentioned sample of students was chosen on the basis of convenience: since one of the classes was peculiarly large; and, the investigator happened to be familiarized with the academic curriculum of the mentioned physics class. Furthermore, such Introductory Mechanics courses are historically remarked for having an average enrollment of over 100 students whose interactive inter-participation during the lecture session results in a quite difficult task to be accomplished. In essence, the study aims to gather information pertaining to how the accessibility of Facebook through students' mobile devices, participants' familiarity with Facebook, and efficient social communication and collaboration exemplified in Facebook interactions, serve as the principal operators in facilitating the academic activities and general curriculum in such a physics course throughout the semester.



## **2.2 Research Question**

It is the principal objective of this study to provide an answer to the following question: Would the hypothetical utilization of Facebook to manage the academic curriculum in particularly large college level Introductory Classical Mechanics courses have a positive effect on students' academic engagement? Moreover, the content in the survey described below was developed such that the gathering of students' reactions would offer the optimal answer to the principal question of the investigation stated above.

## **2.3 Research Instruments**

For the evaluation of the participants' perceptions about the proposed use of Facebook in an Introductory Mechanics course, a survey was selected as the qualitative research tool to gather such information: Thus, out of the 28 items in the survey, questions 1-9 were designated to collect participants' demographics and familiarity with Facebook; questions 10 to 22 were selected to obtain students' level of agreement on their academic impact being positively affected if Facebook was used to mediate their learning process through a variety of academic activities (Likert Scale: agree, strongly agree, neutral, disagree, and strongly disagree); additionally, questions 23-28 were composed of open-ended questions, purposely designed as to invite students to express their views regarding how their academic engagement may be affected if Facebook was utilized to manage specific aspects of the mentioned physics class' academic curriculum. Such aspects include notifications and preparations for lectures via text messages, familiarity and collaborative factors affecting their construction of learning, and posting questions through the proposed Facebook's wall during lectures and examinations (Refer to

appendix A for the actual survey.) Due to the extensive content in the survey, the participants in the study were given 48 hours before submitting it to the principal investigator.

## 2.4 Participants' Demographics

There were 68 males or 64% and 38 females or 36% participating in the study. The following table provides a summary of participants' major and their gender associate:

Table 2.1: Description of Participants' Major in Relation to Gender

<b>Students' Major</b>	<b>Females</b>	<b>Males</b>
Electrical engineering	4	11
Mechanical engineering	5	27
Industrial engineering	1	4
Mathematics	6	3
Computer science	0	13
Pre- engineering	0	1
Physics medical track	2	0
Civil engineering	2	2
Physics	7	3
Chemistry	5	2
Biochemistry	4	1
Geology	2	1

The following table represents the information pertaining to participants' age classification and their gender associate:

Table 2.2: Description of Participants' Age Classification and their Gender Associate

<b>Age category</b>	<b>Females</b>	<b>Males</b>
18-24	35	60
25-29	3	6
30-36	0	2

## Chapter 3: Results

### 3.1 Preliminary Information on Students' Acquaintance with Facebook

In quantifying the students' responses pertaining to having an active Facebook account, 96 out of 106 students or about 91% reported to have an active Facebook account. Thus, only 10 of them or about 9% reported not to have an active Facebook account. The following table represents the information on students' Facebook account and their gender associate:

Table 3.1: Description of Participants' Facebook Account and their Gender Associate

Facebook Account	Females	Males
yes	36	60
no	2	8

After recording participants' responses regarding the longevity of their Facebook accounts, the following statistical information was revealed: 89 out of 106 students reported to have had their Facebook accounts for a period ranging between 3 and 11 years; 10 of them reported not to have a Facebook account; 5 of them said to have had their accounts for a period greater or equal to one year, but less than 3 years; 1 of them was not able to remember his/her Facebook's account longevity; additionally, only 1 of them reported to have had his/her account for less than 1 year. The following table represents such a quantitative description:

Table 3.2: Description of Participants' Longevity of their Facebook Account

Facebook Account's Longevity (in years)	# Of Students
$0 < \text{time} < 1$	1
$1 \leq \text{time} < 3$	5
$3 \leq \text{time} \leq 11$	89
No Account	10
Don't Remember	1

After performing the analysis on the students' responses regarding their daily interaction with Facebook, the following descriptive statistics were obtained: 19 out of the 106 participants in the study reported to interact with Facebook for a period strictly less than 1 hour per day; 67 of them said to interact with Facebook for a period ranging between 1 and 5 hours per day; 9 of them reported to spend 6 hours or more interacting with Facebook; and, 11 of them reported not to have any daily interaction with Facebook. The following table illustrates such a statistical description:

Table 3.3: Description of Participants' Daily Interaction with Facebook

<b>Student's Daily Interaction with Facebook</b>	<b># Of Students</b>
Strictly less than 1 hour	19
1 to 5 hours	67
6 hours and up	9
No interaction	11

When quantifying the principal electronic device employed by participants during their interactions with Facebook, the following statistical information was obtained: 93 out of the 106 students performed such social interactions through a cellular phone; 4 out of 106 did so through a laptop<sup>24</sup>; 2 out of 106 reported to use Facebook through a desktop personal computer<sup>25</sup>; none of the students reported to employ a tablet PC<sup>26</sup> during their Facebook interactions; and, 2 out of 106 interacted on Facebook through an iPad<sup>27</sup> device. The following table illustrates the numbers described above:

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<sup>24</sup> Refer to glossary for definition of laptop.

<sup>25</sup> Refer to glossary for definition of desktop personal computer.

<sup>26</sup> Refer to glossary for definition of tablet PC.

<sup>27</sup> Refer to glossary for information of iPad.

Table 3.4: Description of Participants' Electronic Medium of Choice for Using Facebook

<b>Medium of Interaction with Facebook</b>	<b># Of Students</b>
Cell phone	93
Laptop	4
iPad	2
Desktop PC	2
Tablet	0
No medium	5

Finally, when asking participants about their Facebook activities during their class lectures at the university, the following facts were documented: 49 out of 106 admitted to rarely be logged in; 20 of them reported to be often logged in; 7 out of 106 reported to be always logged in; and, 25 out of 106 reported to never be logged into their Facebook accounts during any of their lectures at the university. The following table provides a quantitative representation of the above description:

Table 3.5: Description of Participants logged into their Facebook Account during Lectures

<b>Facebook Logged in during Lecture</b>	<b># Of Students</b>
Rarely	49
Often	20
Not at all	25
Always	7
Na	5

### **3.2 Data Analysis on the Multiple Choice (Likert Scale) Portion of the Survey Pertaining to Students' Perceived Academic Engagement Due to the Educational Use of Facebook**

When analyzing students' responses about their perception regarding their academic engagement being positively affected by the supposed scenario where a Facebook account for the class was created, thus, every student, lab instructor, teaching assistant, and lecturer would be included, the following information was reported: 42 out of the 106 participants reported to

agree; 13 of them reported to strongly agree; 35 of them had neutral views about it; 11 of them reported to disagree; and, 5 of them reported to strongly disagree with such a proposal. In essence, the majority of the participants reported to have a positive academic engagement if Facebook was used to enhance the learning process for those two particular Introductory Mechanics courses.

When evaluating students' perceptions about how their academic engagement would be positively impacted if the proposed Facebook account was the medium to post examination dates, content, and guidelines, the following statistical information was obtained: 36 of the 106 participants in the study reported to agree; 21 of them strongly agreed; 30 of them reported to be neutral about it; 14 of them disagreed about it; and, 5 of them strongly disagreed with that proposal. Furthermore, the majority of the students reported that their academic engagement would be positively impacted by the use of Facebook to post exam-related material.

When calculating students' perceptions about their academic engagement being positively affected if the supposed Facebook account would have a link to submit their homework assignments, the following information was recorded: 38 out of 106 reported to agree with it; 21 of them strongly agreed; 33 were neutral about it; 12 of them disagreed; and, 2 of them strongly disagreed. Again, the majority of participants reported that the utilization of Facebook as the medium to manage homework assignments would positively affect their academic engagement in such an Introductory Mechanics course.

Regarding the measuring of students' perceptions on how their academic engagement would be positively affected if the supposed Facebook account was used to post questions about class material-related issues, the following set of numerical representatives were reported: 52 of

them reported to agree with it; 27 of them strongly agreed; 18 of them were neutral about it; 6 of them disagreed; 2 of them strongly disagreed; and, one of them did not respond. Again, the majority of participants reported to have a positive academic engagement if Facebook was utilized to post content about class material.

On the investigation about participants' perceptions regarding how their Academic engagement would be positively affected if Facebook was employed to request and post hints about homework assignments, the following statistical facts were recorded: 44 out of the 106 participant agreed with it; 35 of them strongly agreed, 18 of them were neutral about it; 8 of them disagreed; and, 1 of them strongly disagreed. Once more, the majority of the participants reported to have a positive academic engagement if Facebook was the medium to post and request hints about homework assignments.

In examining students' responses about their academic engagement being positively affected if the proposed Facebook was used to create study groups for such a physics class, the following statistical description was documented: 46 of them expressed their agreement; 32 reported to strongly agree; 21 of them had neutral views about it; 6 of them disagreed with it; and, 1 of them strongly disagreed. Moreover, the majority of the students responded that there would be positive effect on their academic engagement if Facebook was used to create study groups for such an introductory physics class.

In regards to students' perceptions on their academic engagement being positively affected if Facebook was used as the medium to post questions about class material-related issues and answer verbally by the professor or classmates during lectures, the following figures appeared: 37 of them reported their agreement; 19 of them strongly agreed; 27 of them were

neutral about it; 21 of them disagreed; and, 2 of them reported to strongly disagree. In essence, the majority of students reported to have a positive impact on their academic engagement if Facebook was used as the medium where students may post questions during lecture sessions and answered verbally by professor and classmates.

When asked students if they believe their academic engagement would be positively affected if such a Facebook account was utilized during examinations to post questions they may have, the following findings were revealed: 36 out of the 106 participants expressed their agreement with it; 15 of them strongly agreed; 30 of them were neutral about it; 15 of them disagreed with it; 10 of them strongly disagreed; and, only 1 of them did not respond. In this case, the majority of the students believed their academic engagement would not be positively affected if Facebook was used during examination for students to ask questions. However, the considerable amount of about 48% of the participants believed that such a proposal would have a positive impact on their academic engagement.

Now, when getting feedback on students' views about their academic engagement being positively affected if Facebook was utilized to post videos and simulations pertaining to physics concepts, the following statistical information was recorded: 42 out of the 106 participants reported their agreement; 37 of them strongly agreed; 22 of them showed neutral views about it; and, 4 of them disagreed with it. In this case, the majority of the students reported that they would have a positive academic impact if Facebook was used to post videos and simulations about physics.



Evaluating students' perceptions regarding their academic engagement being positively altered if the proposed Facebook account would contain web pages which facilitate the learning of physics concepts, the following quantification was formulated: 48 out of 106 participants agreed with it; 31 of them strongly agreed; 22 of them were neutral about it; 4 of them expressed their disagreement; and, 1 of them did not respond. Again, the majority of students responded that there would be a positive academic engagement in the event that such a Facebook account for the class would include web pages which facilitate the learning about physics.

When obtaining feedback on students' perceptions about their academic engagement being positively affected if a text message was sent through the Facebook account 24 hours before a homework assignment was due, the following statistical description resulted: 47 out of 106 participants agreed; 24 of them strongly agreed; 24 of them were neutral about it; 7 of them disagreed; 3 of them strongly disagreed; and, 1 of them did not respond. Furthermore, the majority of students believed that their academic engagement would be positively impacted if a text message was sent to remind them about the homework submission 24 hours in advance.

In exploring students' perceptions regarding their views on their academic engagement being positively affected if a text message was sent via Facebook 24 hours before an examination was executed, the following information was obtained: 43 out of 106 students showed their agreement about it; 21 of them strongly agreed; 28 of them were neutral about it; 9 of them disagreed; 4 of them strongly disagreed; and, 1 of them did not respond. The majority of students perceived that their academic engagement would be positively affected if a text message was sent through Facebook reminding them that an examination will be executed in 24 hours.

Regarding to measuring participants' perceptions on their academic engagement being positively affected if study guides for examinations were posted in the Facebook account for the class, the following statistical description was recorded: 37 out of the 106 participants in the study agreed, 38 of them strongly agreed; 25 of them were neutral about it; 4 of them disagreed; 1 of them strongly disagreed; and, one of them did not respond. Essentially, the majority of the students believed that their academic engagement would be positive affected if study guides for examinations were posted in such a proposed Facebook account for the class.

For simplicity purposes, the capital letters shown on the left side of the following set of equations were utilized to represent the questions 10 to 22 in the multiple choice (Likert Scale) portion of the survey. Specifically, the letters A to M are used to codify each one of the proposed questions in the survey pertaining to the academic activities employing Facebook to enhance the learning of physics respectively, and the letter N, in a similar fashion, is a representative of the average number of students' answer of choice in the Likert Scale, as shown in the table on page 33:

**A** = What is your perception regarding your academic engagement being positively impacted if a Facebook account was created and used for a physics course like this one (Introductory Mechanics) as to enhance your active participation during the learning process, and every student, lab instructor, teaching assistant, and professor was included in such an account?

**B** = Do you perceive that your academic engagement may be positively affected if a Facebook account was the medium where the examination dates, content, and guidelines were posted?

**C** = Do you perceive that your academic engagement may be positively affected if a Facebook account would have a hyperlink on its wall, directing you to the website where the homework assignments were submitted?

**D** = Do you perceive that your academic engagement may be positively affected if you and your classmates would be allowed post questions about class material on such a Facebook account's wall?

**E** = Do you perceive that your academic engagement may be positively affected if you and your classmates may create a post, requesting hints about particular homework assignments on such a Facebook account's wall?

**F** = Do you perceive that your academic engagement may be positively affected if such a Facebook account would serve as the medium to create study groups for a physics course like this one (Introductory Mechanics)?

**G** = Do you perceive that your academic engagement may be positively affected if every student and professor was logged into such a Facebook account for the class during the lecture session, allowing for questions about class material to be posted and answered verbally by the professor or classmates?

**H** = Do you perceive that your academic engagement may be positively affected if every student and professor was logged into such a Facebook account during examinations, where questions, comments, and/or concerns were posted by students and answered verbally only by the professor?

**I** = Do you perceive that your academic engagement may be positively affected if videos and simulations on physics concepts were posted or uploaded periodically on such a Facebook account's wall as to enhance the students' learning about the class material?

**J** = Do you perceive that your academic engagement may be positively affected if such a Facebook account would include websites containing material which would facilitate the learning of physics (introductory mechanical concepts)?

**K** = Do you perceive that your academic engagement may be positively affected if a text message was sent through such a class Facebook account 24 four hours before the homework assignments are due?

**L** = Do you perceive that your academic engagement may be positively affected if a text message was sent through such a class Facebook account 24 hours before an examination was executed?

**M** = Do you perceive that your academic engagement may be positively affected if study guides for examinations were posted on the Facebook account's wall?

**N** = Average number of students selecting a particular answer in the Likert scale.

The following table provides a quantitative description of students' level of agreement with the creation of a Facebook account for the class as to manage academic activities (as described above) pertaining to homework assignments, examinations, class material, and the creation of study tactics:

Table 3.6: Description of Participants' Level of Agreement with Facebook Managing the Academic Content and Assessments for an Introductory Mechanics Course

<b>Academic Activities Employing Facebook to Enhance the Learning of Physics</b>	<b># Of studts. s. disag.</b>	<b># Of studts. disag.</b>	<b># Of studts. neutral</b>	<b># Of studts. agreeing</b>	<b># Of studts. s. agreeing</b>	<b># Of studts. not responding</b>
A	5	11	35	42	13	0
B	5	14	30	36	21	0
C	2	12	33	38	21	0
D	2	6	18	52	27	1
E	1	8	18	44	35	0
F	1	6	21	46	32	0
G	2	21	27	37	19	0
H	10	15	30	36	15	0
I	0	4	22	42	37	1
J	0	4	22	48	31	1
K	3	7	24	47	24	1
L	4	9	28	43	21	1
M	1	4	25	37	38	1
N	3 –3%	9 ---8%	25 –24%	43 –40%	25 –24%	1 –1%

The following chart illustrates the students' level of agreement with the proposed scenario where Facebook was utilized to command the academic curriculum in an Introductory Mechanics course. The horizontal axis represents the 13 academic activities being commanded through Facebook. For convenience, every scenario or academic activity is coded with a letter (A being the first one in the table above and M being the last one. Notice: the letter N represents the average number of participants gathered around each one of the choices in the Likert Scale). The vertical axis is a representation of the number of participants accumulated in each one of the levels of agreement with the use of Facebook to manage the mentioned academic activities in an Introductory Mechanics course:

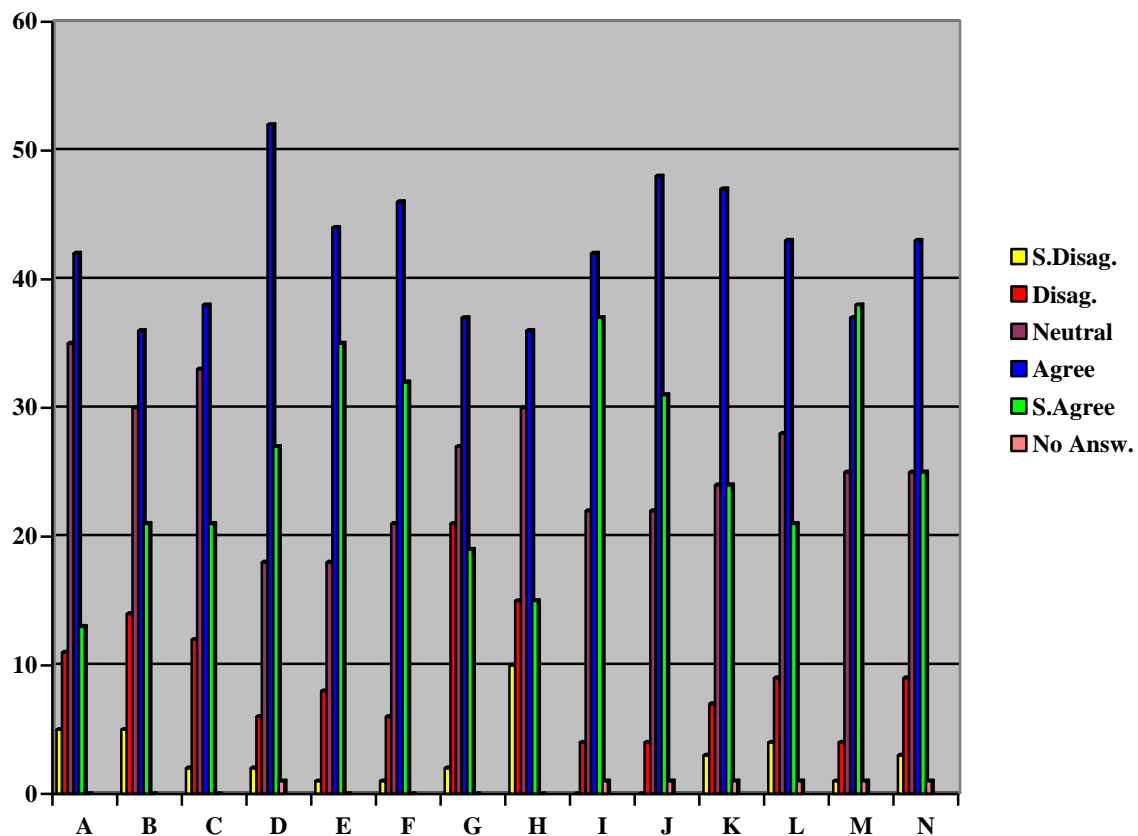


Figure 3.1: Description of Participants' Level of Agreement with Facebook Managing the Academic Activities in an Introductory Mechanics Class

### **3.3 Data Analysis on the Open-ended (qualitative) Portion of the Survey Pertaining to Students' Perceived Academic Engagement Due to the Educational Use of Facebook**

Now, after the examination of the qualitative portion or open-ended questions on the survey concluded, it was discovered that when asked participants to elaborate on their perceptions regarding how their academic engagement would be impacted in the event that a text message containing a physical situation illustrating the concepts covered in the next lecture was sent through the proposed Facebook account for the class a couple of hours prior to the lecture, thus, they would have to respond to a physical situation, the following information was obtained: 85 out of 106 participants wrote positive statements about such a proposal; 16 out of the 106 students believed that there would not be any impact on their academic engagement; and, 5 out of the 106 individuals did not respond to the question. In essence, the majority of the students showed a positive attitude towards the proposed preparation modality. The following table is an exemplification of the most common positive and negative statements expressed by the students in regards to the above scenario (refer to appendix B for the complete exemplification of students' reactions to the above scenario):

Table 3.7: Description of Participants' Most Common Statements about Facebook Serving as the Medium to Provide Preparation for the Coming Lecture

Participants' Positive Statements	Participants' Negative Statements
It is a good way to introduce a concept and not waste time at beginning of class.	If this were to be done, I think everything should be done through Blackboard and email.
I would be able to ask questions about what I did not understand.	I wouldn't be having my personal Facebook with a class I am gonna take for only 6 months.
Reminders and pointers would make the class easier to engage in.	If all these resources are in Facebook there would be a possibility that I will miss a little bit of classes.
I check Facebook more often than Blackboard, so this would be a benefit since I am always logged in Facebook.	It might not be of much help. I have classes before this one so I wouldn't use it
I will help me to practice the topic more and develop a good habit.	I am neutral about it.
If I am required to participate with a response, then it will motivate me to look at the material before class.	Geologists do fieldwork that keep us from internet access some/most weekends.

When asked students to write about how their academic engagement would be affected in the event that a text message containing the concepts and procedures covered during the next laboratory practice was sent through their Facebook a couple of hours prior to the laboratory practice, the following statistical description was reported: 80 out of the 106 participants expressed their positive views about it; 18 out of the 106 believed that there would be no impact on their academic engagement; and, 8 out of 106 participants left the question blank. Again, the majority of the participants in the study believed that their academic engagement in this class would be positively affected by this proposal. The following table is an exemplification of the most common positive and negative statements expressed by the students in regards to the above scenario (refer to appendix B for the complete exemplification of students' reactions to the above scenario):



Table 3.8: Description of Participants' Most Common Statements about Facebook Serving as the Medium to Provide Preparation for the Coming Lab

<b>Participants' Positive Statements</b>	<b>Participants' Negative Statements</b>
It will prepare me a lot better, especially for lab quizzes.	I don't check Facebook often.
It will feel more interested in attending because I know the subject after "brushing up" on the topic and more confident in applying the knowledge.	Attendance is already pretty mandatory, so a remainder wouldn't make much of a difference.
It will help in reminding me to go to the labs.	For the lab, I don't think it would make much of a difference since materials are usually online before each session anyway.
I will be finishing the lab experiment faster since I can do a background research in order to be prepared.	I am neutral about it because the pre-lab assignments are enough to prepare us for labs.
This would be extremely helpful since sometimes the lab experiments deal with topics that we haven't yet covered in class.	I will not like Facebook in the lab.
I would enjoy it more since I would have Facebook to advise me on what will happen.	Labs already have this sort of system in place with the pre-labs.

When asked the participants about how their academic engagement for the class would be affected in the event that practice exams were posted in the proposed Facebook account for the class 3 days prior to the execution of the actual one, thus, every student may ask the professor and classmates for hints on how to resolve them, the following quantification was formulated: 85 out of 106 wrote positive statements about such a proposal; 12 out of the 106 participants expressed their disinterest toward this proposal; and, the remaining 9 participant did not respond to the question. Once more, most of the students in the study were in favor of such a proposal. The following table is an exemplification of the most common positive and negative statements expressed by the students in regards to the above scenario (refer to appendix B for the complete exemplification of students' reactions to the above scenario):

Table 3.9: Description of Participants' Most Common Statements about Facebook Serving as the Medium to Post Practice Exams

<b>Participants' Positive Statements</b>	<b>Participants' Negative Statements</b>
It would prepare us all; we all would be helping each other out.	I feel this should be done through Blackboard.
Reminding me would make a huge difference because I tend to forget.	Sounds like a good idea, but I wouldn't like getting constant notifications.
It would be a great help especially if people can reply quick and accurately.	I wouldn't study.
I can get notified on my phone making it more accessible.	3 days before the actual exam seems too short of a time.
We would be more motivated to study topics we lack on.	Students will be tempted to be distracted.
People would be more comfortable in asking questions.	I wouldn't remember to check my Facebook.

When asked participants to elaborate on how their Facebook's level of accessibility and familiarity may have an impact on their academic engagement in the event that such a Facebook account was utilized to mediate their learning process in a physics class like this one, the following figures were obtained: 68 out of the 106 students in the study believed that there would be a positive impact on their academic engagement; 29 out of the 106 stated that there would be no impact on their academic engagement; and, 9 students in this sample did not respond to the question. Again the majority of students stated that the familiarity and accessibility factors would make a difference in their academic performance in the event that such a Facebook account was used to manage the academic content for the class. The following table is an exemplification of the most common positive and negative statements expressed by the students in regards to the effects of their level of accessibility to and familiarity with Facebook having an

impact on their academic performance (refer to appendix B for the complete exemplification of students' reactions to the above scenario):

Table 3.10: Description of Participants' Most Common Statements about their Facebook's Level of Accessibility and Familiarity Impacting their Academic Engagement

Participants' Positive Statements	Participants' Negative Statements
It will make the communication easier.	I would prefer to keep Facebook more leisure oriented and Blackboard for educational purposes.
Familiarity and accessibility will help me get a better grade, since it would be easier to download files, and ask questions.	I don't think it would be too hard as for to learn how to use it.
It would be highly accessible, especially through my Smartphone <sup>28</sup> .	Familiarity and accessibility would help the engagement outside the class, but it may negatively affect the learning process during lectures.
It is a great idea to take advantage of the fact that people are in their phones most of the time.	My parents don't allow me to use too much my cell phone, therefore this is bad for me.
I would be using Facebook more than Blackboard.	Facebook is too much of a distraction. I think social media and education should not be combined
The fact that Facebook has been around for so long makes it easier to use for just about any age group.	The professor makes the difference, not the level of accessibility.

When asked participants to elaborate on how the interactive involvement and collaborative dynamism naturally emerging with this particular utilization of Facebook as the medium to manage the academic content of a physics class like this one (Introductory Mechanics) may have an impact on their academic engagement during the learning process, the following information was reported: 74 out the 106 participants in the study believed that such interactivity and collaboration through Facebook would have a positive impact on their learning; 22 of the 106 believed that there would be no impact on their academic engagement; and, the remaining 10 participants did not respond to this question. Once again, the majority of

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<sup>28</sup> Refer to glossary for definition of Smartphone.

participants in this study wrote positive comments about the mentioned attributions of Facebook. The following table is an exemplification of the most common positive and negative statements expressed by the students in regards to the effects of the intrinsic collaboration factor embedded in Facebook communication having an impact on their academic engagement (refer to appendix B for the complete exemplification of students' reactions to the above scenario):

Table 3.11: Description of Participants' Most Common Statements about the Collaboration Factor in Facebook having an Impact on their Academic Engagement

<b>Participants' Positive Statements</b>	<b>Participants' Negative Statements</b>
You have to take into account people like me that don't have Facebook. It would be nice to create a website where all students can access freely without having to sign into third party application. If this is done, then I agree that my academic engagement will be positively impacted.	Having study material on Blackboard would be easier than having them on Facebook. Facebook doesn't have a simple way to file materials. Hashtags are too complicated, and I wouldn't like to search through a timeline.
Facebook will be a great tool for networking among peers if you need help on anything.	It'll be helpful having all the material in Facebook, but I look for help in YouTube.
Facebook interactivity is a crucial part of making this work, since when people need help, they need a quick response. This is a great way to have study groups and group discussions.	As it stands, Blackboard doesn't affect my academic engagement, don't think Facebook would make a difference.
Since I am shy, being able to see others ask questions would encourage me to ask more questions.	Some students can't access such stuff.
I feel like something like that is needed, because what we cover in class and what we get for homework is different. So rather than wasting lecture time on solving questions, we would post it on Facebook and a discussion group.	The 'messenger' feature of Facebook allows us to communicate directly, however, it might be hard to follow the conversation since the whole class is talking.
Because students are constantly on their phones, it makes complete sense to incorporate them into class time.	It would help me, but also I think it will be weird knowing the whole class know my Facebook and other personal stuff.

Finally, when asked students to elaborate on their perception regarding how, through the Facebook account for a physics class like this one, the posting of questions by students about class material during the lecture session may have an impact on their class participation and academic engagement, the following statistical description was formulated: 67 out of the 106 participants in the study wrote a positive statement about such a proposal; 29 out of the 106 believed that their academic engagement would not be positively impacted by this proposal; and, 10 of them did not respond to the question. As found throughout the open-ended questions, the majority of the students were in favor of this proposal. The following table is an exemplification of the most common positive and negative statements expressed by the students in regards to the utilization of the Facebook's wall as to post questions about the class material during lectures (refer to appendix B for the complete exemplification of students' reactions to the above scenario):

Table 3.12: Description of Participants' Most Common Statements about the Posting of Questions on Facebook's Wall during Lectures

Participants' Positive Statements	Participants' Negative Statements
Sometimes many students have the same question, it is just that sometimes we can feel embarrassed of asking. It makes it less intimidating through Facebook I guess.	I think I might get too distracted looking at other things on Facebook.
It would be a great source and would be better than hiring a tutor for questions you could just post on Facebook and get answers from peers, TA's, and the Professor.	It's no big difference. I think the "old way" is better.
This would allow students who can't be heard to have their questions answered.	Blackboard is there for such interactions.
I find that for a big class is hard to be noticed in. I took an astronomy class where the professor answered questions by txt message during the lecture - it was easier than shouting, and no one was ignored. It was great.	Receiving answers through text may be no different than looking it up in the internet.
I feel like students rather type a question than ask because you have a chance to formulate your question, and make sure you have all the information correct before asking.	Asking questions may help some students, but I am a visual learner and slow one so reading alone does not help me. Perhaps if the professor makes a YouTube channel.
Facebook would help by keeping those questions posted and if class finishes and the professor could not answer your question, he may answer after class through Facebook.	To me, this is the only place where this idea fails, since this is not a hybrid class.

The following table summarizes the participants' statements about how their academic engagement would be impacted if Facebook was utilized as described by the suggested scenarios mentioned above:

Table 3.13: Open-ended Questions' Descriptive Statistical Results

<b>Open-ended questions on their academic engagement</b>	<b># Of participants perceiving a positive impact on their academic engagement</b>	<b># Of students perceiving no impact on their academic engagement</b>	<b># Of students not responding</b>
Text message as class preparation through Facebook (A)	85	16	5
Text message as lab preparation through Facebook (B)	80	18	8
Practice exam preparation through Facebook (C)	85	12	9
Facebook Familiarity and accessibility factors (D)	73	24	9
Facebook collaborative Activities (E)	74	22	10
Questions and class participation through Facebook during lectures (F)	67	29	10
Average # of participants	77 ---- 73%	21 ----- 20%	8 ----- 7%

The following chart illustrates the graphical representation of participants' responses to the open-ended questions. For convenience, the letters A through F on the horizontal axis were assigned as to represent the questions or proposed scenarios. Likewise, the vertical axis symbolizes the number of students writing a positive or negative statement about how their academic engagement would be affected by the proposed utilization of Facebook for the academic activities described above (Notice: the amount of students not responding to the questions is also computed in the vertical axis):

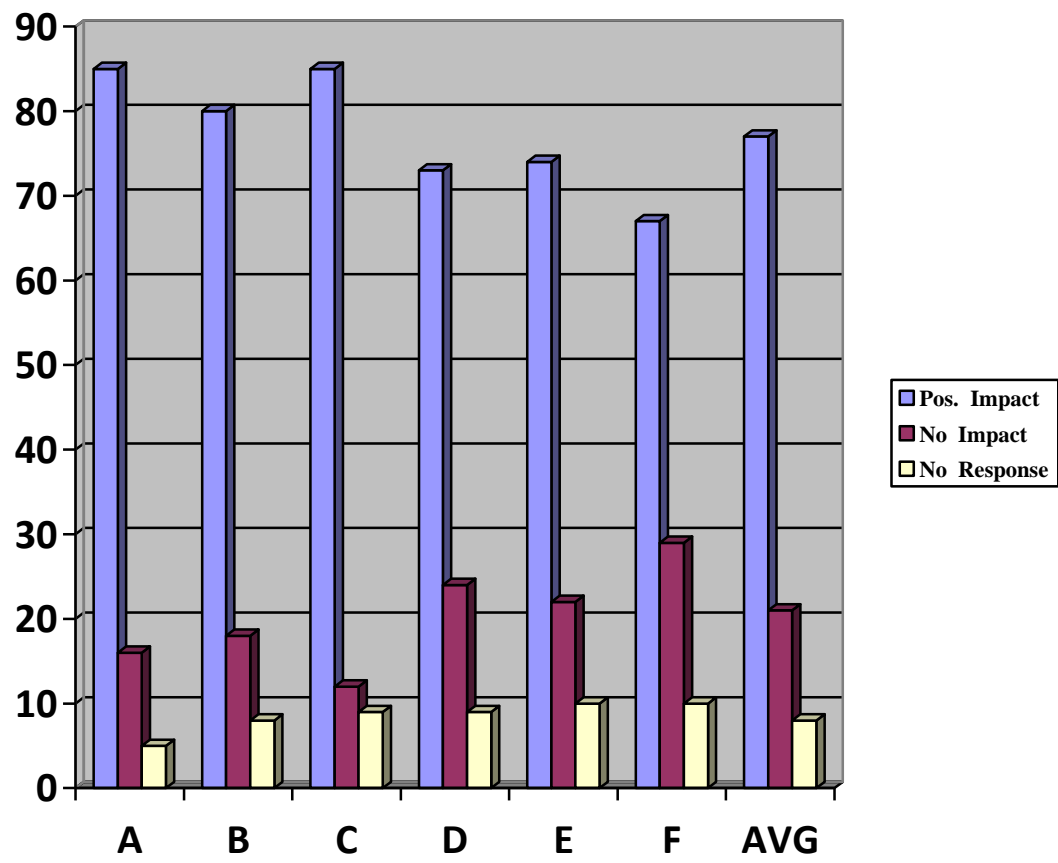


Figure 3.2: Participants' Written Statements about the Inclusion of Facebook into the Academic Curriculum for the Introductory Mechanics Course



## Chapter 4: Discussion

### 4.1 Conclusive Analysis

**4.1.1 General Evaluation.** As the statistical analysis on the participants' responses to the multiple choice questions pertaining to their academic engagement concluded, the following information was revealed: on average, 68 out of 106 participants or 64% reported to agree or strongly agree with the argument about the proposed utilization of Facebook for managing the academic curriculum for this particular Introductory Mechanics course (PHY 2420) would enhance their academic engagement; additionally, the remaining 36 % of this sample of participants were neutral about it, disagreeing about it, or did not respond to the question. In regards to the students' responses to the open-ended questions, the following statistical analysis was formulated: on average, 77 out of 106 participants or 73% stated to have a positive impact on their academic engagement if Facebook was implemented in the mentioned physics class; moreover, the remaining 27% of the participants reported to be neutral about it, did not respond to the questions, believed there was no significant impact on their academic engagement, or had negative views about it. Furthermore, if taking the average of students' feedback on both, the multiple-choice and the open-ended portions of the survey, the following figures resulted: about 69% of the participants expressed a positive attitude toward the hypothetical employment of Facebook as the medium to command all of the academic activities in the PHY 2420 class; additionally, the remaining 31% of this sample believed that their academic engagement would not be affected by the inclusion of Facebook, did not respond to the questions, were neutral about this proposal, or simply expressed their negative views about it.

**4.1.2 Analysis of the peculiarities emerging from the students' responses to the multiple choice (Likert Scale) portion of the survey.** After comparing the number of participants strongly agreeing with the implementation of Facebook to manage each one of the academic activities in the course, it was revealed that the greatest concentration (38 out of 106 participants) appeared in the proposed scenario where a study guide for examinations was posted on the Facebook' wall for such an Introductory Mechanics course, thus, professor and classmates would be allowed to collaborate together in resolving such a task. Moreover, when looking at the students' written responses pertaining to examinations, in general, it was noticed that such a significant amount of participants strongly agreeing was attributed to the following facts: communication through Facebook is much easier and faster; there would be more interaction between students and professor; and, since some students are shy, being able to see others ask questions would encourage them to ask more questions. A similar amount of students (37 out of 106 participants) reported to strongly agree with the proposed situation where videos and computer simulations were posted on the Facebook's wall as to enhance the students' learning of classical mechanistic concepts. Moreover, when examining the students' written responses, in general, for corroboration of such statistical results, the following supportive information was found: participants in the study believe that visual learners and slow ones would not benefit from reading alone; additionally, some students would favor the idea of using Facebook because they look for help on YouTube anyways. It was similarly noticed that the substantial amount of 52 out of 106 participants reported to agree with the proposed scenario where every student enrolled in the course was allowed to post questions on the Facebook' wall about the class content-related issues. Furthermore, when looking at the written responses for validating such statistical peculiarities, the following peculiarities were unveiled: students expressed their beliefs about

their effortless inclination to participate through Facebook; getting notified through their cell phone would make the collaboration more accessible; people would be more comfortable in asking questions; and, communicating through Facebook would be very helpful, since students can chat and perform a variety of operations through the multiple features of such a social network.

During the analysis of the multiple choice questions on the survey, it was further discovered that the greatest cluster of participants disagreeing with the infusion of Facebook into the proposed academic activities (21 out of 106 students) was found in the proposed scenario where every student and professor would be logged into such a Facebook account for the class during the lecture sessions, allowing for questions about class material to be posted and answered verbally by the professor or classmates. Now, with the available complementary information obtained from students' responses to the open-ended questions, such statistical information was explicitly clarified: such a significant amount of disagreement was due to the fact that students would tend to be surfing into their personal activities; such a Facebook' wall would be saturated with an excess of questions and answers; and, receiving answers through text may be no different than looking them up in the internet. Moreover, the second greatest gathering of students disagreeing with the use of Facebook to mediate a specific academic activity was found in the proposed scenario where every student and professor was logged into such a Facebook account during examinations, thus, the questions would be posed by students and answered verbally only by the professor. When evaluating the students' witting statements, it was clarified that such a discontent was mainly attributed to participants' perceptions about Facebook promoting distractions in the classroom, if implemented during examinations.

**4.1.3 Analysis of the peculiarities emerging from the students' responses to the open-ended (qualitative) portion of the survey.** In summarizing the discussion about the students' written responses on the qualitative portion of the survey, it was discovered that the greatest concentration of students (29 out of 106) perceiving that there would not be any significant impact on their academic engagement by the utilization of Facebook in such an Introductory Mechanics class was found in the question inviting participants to express their views regarding the utilization of Facebook to post questions during lectures, as similarly confirmed by the findings on the students' responses to the multiple choice questions. Moreover, such a significant number of students perceiving no significant impact on their academic engagement was mainly due to students' suspecting that if utilized during lectures, Facebook would serve as a disturbing mechanism rather than assisting the class participation dynamics. It was further revealed that the second greatest accumulation of participants (24 out of 106 participants) perceiving no academic impact was found in the question inviting students to elaborate on how the familiarity and accessibility associated with the use of Facebook might be crucial factors in determining students' academic engagement if Facebook was to be implemented in such a physics course. Such a noticeable amount of participants believing there would be no impact on their academic engagement due to the mentioned factors was attributed to the following: students believing that learning how to manage Facebook would be relatively simple even for individuals with absolutely no experience with such a social network; students believing that everybody has a cellphone these days, so the accessibility factor was taken for granted; and, students in this subgroup further reported to believe that familiarity with Facebook would not be an impediment if it was utilized for the mentioned educational purposes since everybody is quite familiar with it nowadays, as reported by participants in the study.

Continuing the conclusive analysis on the students' written responses about the use of Facebook to mediate the academic activities in such an Introductory Mechanics course, it was revealed that the greatest accumulation of students (85 out 106 participants) perceiving a positive impact on their academic engagement was encountered in the proposed scenario where students would be notified via text message through Facebook about the material covered in the coming lecture, thus, students were required to answer a question on specific concept(s). Such a remarkable number of participants perceiving that the mentioned preparation system would enhance their academic engagement was accredited to the following factors: students staying more up to date in any class material learned daily; this system being a good way to complement the lecture; and, the fact that if students were required to participate with a response, then it will motivate them to look at the material before class, as stated by students. It was further noticed that an equal amount of participants (85 out of 106) was found in the question inviting students to express their views regarding the supposed scenario where a practice exam was posted on the Facebook account for the class, thus, every student would be allowed to ask the professor and classmates for hints on how to resolve it. Moreover, such a significant amount of students perceiving that the mentioned modality of preparing them for examination would positively affect their academic engagement was attributed to the following factors: Facebook being easier to access than Blackboard; such a collective and interactive approach to resolve the practice examinations would be crucial in making sense of physics concepts; and, such a notification or reminding system would be really helpful, especially for students who tend to forget about examination dates, as mentioned by participants.

## 4.2 Limitations of the Study

After the analysis of data obtained from the sample of science and engineering students' perceptions on the proposed educational utilization of Facebook in an Introductory Mechanics course concluded, it was observed that there were some limitations intrinsically embedded in the study design. Particularly, as the proposed scenario where Facebook was used as the medium to manage the academic curriculum in such a physics course was presented to such a sample of students, the study failed to clarify if participants enrolled in such a class would have to create a separate Facebook account for the class, or if they would be able to use their personal Facebook account. Thus, in the event that they could use their personal Facebook account for such educational purposes, the investigation's proposal further failed to indicate how the participants' private activities would be secured or isolated from the academic-related collaborations within the class, since such privacy concerns emerged quite often throughout the examination of students' responses. Moreover, the lack of clarification on the mentioned privacy issues could have imposed some constraints on participants' perceptions about such a proposed employment of Facebook for academic purposes.

Now, the fact that a couple of questions on the survey (questions: 7 and 9, see appendix A) invited students to provide information on how much of their daily time they spent logged into their Facebook accounts, and if participants were logged into their Facebook accounts during any of their lectures respectively could have been interpreted in the following two ways: as actually interacting with Facebook, or simply being logged in without any interaction at all. Moreover, such a misinterpretation could have influenced students' precise figures on such questions.

Finally, the fact that the study failed to clarify if the proposed utilization of Facebook to mediate the academic curriculum in such an Introductory Mechanic course would be taking the place of Blackboard, or if it would be used concurrently with Blackboard may delineate restrictions on participants' views concerning such a proposal, as emerged during the course of the data analysis.

#### **4.3 Recommendations for Future Studies**

From the analysis of the preliminary questions in the survey regarding participants' social media of choice, it was revealed that only 3 out of the 106 participants reported not to have any social media account; the remaining 103 participants admitted to socially interact though Facebook, SnapChat<sup>29</sup>, Twitter, Instagram<sup>30</sup>, YouTube, Skype, and/or WhatsApp<sup>31</sup>. Thus, researchers investigating the impacts of digital technologies on education are urged take advantage of the tremendous popularity of such an unprecedented communication via social media. Moreover, as emerged during the course this particular investigation, it is advised that future researchers explore the outcomes of the integration of more than one social network for mediating the academic curricula. Furthermore, since the majority of the students reported to use their cell phone as the medium to interact with social media (93 out of 106 participant), it is recommended that educational technological researchers examine the possibilities of utilizing the multiple features or mobile applications, embedded in most cellular phones, as didactical tools within academic environments. Additionally, in the event that such an investigation pertaining to the utilization of Facebook to enhance the academic engagement in an Introductory Mechanic

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<sup>29</sup> Refer to glossary for definition of SnapChat.

<sup>30</sup> Refer to glossary for definition of Instagram.

<sup>31</sup> Refer to glossary for definition of WhatsApp.

course takes place, researchers are encouraged to implement training mechanisms for the individuals in the study who are not accustomed to navigate through such virtual settings. Finally, researchers investigating the use of social media to mediate the content of any academic course must pay particular attention to students' privacy concerns, since as stated in this investigation, students were particularly worried about their classmates inquiring about their personal activities if utilizing their existing social media account for such an academic course in question. Hence, such investigators are advised to create a group in Facebook for such a course so that it is merely used to manage the academic activities in the class, thus, the personal activities of every student would be secured. Alternatively, students participating in the study may be asked to create a social media account which would be used only for the academic activities going on in the class.

#### **4.4 Implications of the Study**

**4.4.1 Positive academic impacts of utilizing Facebook.** As the investigation concluded, the holistic examination of participants' reactions to the open-ended questions on the survey gave rise to a set of unique implicative discoveries: indisputably, the interactive collaboration intrinsically associated with Facebook communication was among the most invoked arguments in enhancing the learning of classical mechanistic concepts; the participants' level of accessibility to and familiarity with Facebook will definitely make a difference in student's academic performance and engagement, if such a proposed utilization of Facebook is in fact implemented to mediate the academic curriculum in an Introductory Mechanics course, as suggested by the finding of the study; the utilization of Facebook to manage the questions and answers dynamics during lectures in particularly large classes would be an asset due the



accessibility through students' cellular phones; the participation through Facebook would be less intimidating; students would have more time to formulate their questions, if posted on Facebook; the utilization of Facebook to form study groups and collectively collaborate on homework assignments, practice exams, and course content in general, results peculiarly advantageous for international students, living in Ciudad Juarez, Mexico (across the border), who struggle with the maneuvering of physical meeting; furthermore, reminders and pointers through Facebook would benefit those students with higher propensity to procrastinate, and/or forget about assignments' deadlines.

**4.4.2 Negative academic impacts of utilizing Facebook.** Such versatile features embedded in Facebook could also give rise to adverse academic effects, if formally implemented into academic curricula: for instance, students may deviate their attention towards surfing into their personal activities during lectures; the Facebook's wall may become saturated with an excess of questions and answers, when posting questions during lectures; geology students may find such an online communication through Facebook unfavorable, since they tend to perform field explorations during the weekends where access to the internet is unattainable; if there would be such an abundant amount of study resources contained within such a proposed Facebook account for the class, students would be inclined to miss lectures; the idea of sharing one's Facebook personal profile results disturbing for some students; the lab attendance is mandatory, so sending a reminding text message through the Facebook account would be purposeless; additionally, failing to appropriately synchronize the proposed Facebook system, for managing the academic curriculum in an Introductory Mechanics course, with Blackboard Course Management System might generate an unfavorable learning environment, as stated by participants.

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## Glossary

**Blog-** A weblog (blog) is a website that contains a log or diary of information, specific topics or opinions. A blog author (blogger) links to stories or other websites with relevant and interesting information. These links are typically segregated according to the blog's topic or subtopic and written in reverse chronological order, meaning that the most current links display at the top of the blog's home page. Another major characteristic of blogs is the ease of use to post. Prior to blogs, you needed to understand HTML to produce a website or otherwise involve a back-end production team. Blogs opened up online publishing to the masses.

**Blackboard Course Management Systems-** Blackboard Course Management Systems have become an integral part of the higher education system. They make teaching and course management easier by providing a framework and set of tools for instructors. The administrative aspects of such systems may include class rosters and the ability to record students' grades. With respect to the teaching aspects, however, it could include learning objects, class exercises, quizzes and tests. The CMS may also include tools for real-time chat, or asynchronous bulletin board type communications. The CMS tool also focuses on all aspects of teaching, learning and teacher-student interaction.

**Classical mechanics-** Classical mechanics is the study of motion based on the physics of Galileo Galilei and Isaac Newton. While mathematics is the language of physics, one will only need to be familiar with high school level algebra, geometry, and trigonometry. The small amount of additional math and calculus that one needs will be developed during the course.

**Cellular phone-** A cellular phone is a telecommunication device that uses radio waves over a networked area (cells) and is served through a cell site or base station at a fixed location, enabling calls to transmit wirelessly over a wide range, to a fixed landline or via the Internet. In this networked system, the cellular phone is identified as a mobile system consisting of the equipment and SIM card that actually assigns the mobile telephone number. A cellular phone is also known as a cellphone or mobile phone.

**Chat-** Chat refers to the process of communicating, interacting, and/or exchanging messages over the Internet. It involves two or more individuals that communicate through a chat-enabled service or software. Chat is also known as chatting, online chat, or Internet chat. Chat may be delivered through text, verbal, audio, visual, or audio-visual (A/V) communication via the Internet. If conducted through a desktop, chat requires software that supports Internet Relay Chat (IRC) or an instant messenger application, where a central server manages chat communication between different end user clients. There are also online chat services that require users to sign up with a valid email address. After signing up, a user may join a group chat room or send a private message to another individual. Online chat services have purpose-built chat interfaces that manage the entire communication processes.

**Collaborative learning-** Collaborative learning is an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product. According to Gerlach, "Collaborative learning is based on the idea that learning is a naturally social act in which the participants talk among themselves (Gerlach, 1994). It is through the talk that learning occurs."

**Connectivism-** Connectivism is a learning theory that explain how the internet technologies have created new opportunities for people to learn and share information across the World Wide Web and among themselves. This technology includes Web browser, email, wikis, discussion forums, social networks, YouTube, and any other tool which enables the user to learn and share information with other people.

**Critical pedagogy-** According to Neumann (2011), Critical pedagogy is often encompassed by a cognitive, rational activity: inquiry, analysis, discourse, and action. However, the validity of such an activity resides on beliefs about causes and effects, about desires and motivations, even distinguishing right from wrong doing. That is to say, critical pedagogy is a rational activity that trusts in a variety of anticipatory assumptions: Society can be changed through critical action, dialogue, and education; people want to learn and use its language and analytical structures; additionally, people want to challenge existing structural power dynamics (Neumann, 2011).

According to Freire (1987), critical pedagogy is the integration which results from the capacity to adapt oneself to reality plus the critical capacity to make choices and to transform that reality. "To the extent that man loses his ability to make choices and is subject to the choices of others, to the extent that his decisions are no longer his own because they result from external prescription, he is no longer integrated... If man is incapable of changing reality, he adjusts himself instead (p. 4)."

**Facebook-** Facebook is a free social networking Web platform that promotes and facilitates interaction between friends, family and colleagues. Facebook was founded in 2004 by Mark Zuckerberg and several Harvard University classmates.

**Google Docs-** Google Docs is a Web-based document management application for creating and editing private and public, word processing and spreadsheet documents. These documents can be stored both online on the Google cloud and/or on the user's computer. Access to these files is available from any computer with an Internet connection and a fully-featured Web browser. The documents may be viewed by other google groups and members with the document owner's permission.

**Hashtag-** A hashtag is a type of tag used to describe topics on social networking websites, most notably Twitter. Hashtags, like all tags, are a type of metadata (data about data). Twitter has popularized the use of the term hashtag, though there are some other social networks that use it. On Twitter, Hashtags give other users and indication what a particular tweet is about. Hashtags are indicated as such because they are prefixed with the pound symbol (#). A tag is basically a keyword. It's a non-hierarchical method to describe something. For example, take an article that

is about security and cloud computing. It would be tough to classify such an article in just one category. Using tags, you can describe that the content is about both topics and differentiate it from, say, an article on cloud computing and performance.

**Hyperlink-** A hyperlink is an element in an HTML document that links to either another portion of the document or to another document altogether. On webpages, hyperlinks are usually colored purple or blue and are sometimes underlined

**Instagram-** Instagram is an online photo sharing service. It allows users to apply different types of photo filters to pictures with a single click, then share them with others. While is a rather basic service, Instagram's simplicity has helped it gain widespread popularity. While nearly all smartphones have built-in cameras, they often do not produce quality photos. By using Instagram, users can liven up otherwise mediocre images and make them look more professional. For example, Instagram's Valencia filter brightens photos and enhances the contrast, improving the appearance of drab photos. The Earlybird filter adds a slight blur to the image, warms the colors, and vignettes the corners, giving photos a softer look. users can also make more drastic changes to photos using a filter like "1977," which makes images look like vintage photographs taken with an old camera. The two primary ways to use Instagram are the Instagram website (Instagram.com) and the Instagram app. The website allows users to upload images, manage your photos, apply filters, and share them with friends. The app allows users to take pictures with their iPhone or Android device and immediately apply the filter of third choice. Users can share photos directly on Instagram.com or on other social media websites like Facebook, Twitter, and Tumblr. NOTE: Instragram was acquired by Facebook in 2012 for approximately \$1 billion.

**Instant Message (IM)-** An Instant Message is a real-time, text-based communication similar to chat. IM uses a shared software client between or among two or more people using personal computers, iPhones or other devices. The communication is done over a network, often the Internet, and may include advanced modes with live voice or video. File transfers are also sometimes allowed but are limited in size.

Although included in the online chat category of technologies, IM differs in that the communicating parties are selected from a known list, called a “buddy list,” “friend list” or “contact list.” Users are typically alerted when someone on their list is online. However, online chat allows communication in a multiuser environment among users that are usually anonymous. Some IM systems permit messages to be sent when the recipient is not online. In these cases, IM is much like email; in fact, the message may even be sent to the recipient's email address.

**iPad-** An iPad is a tablet PC designed by Apple Inc. The iPad features a 9.7-inch touch screen that users can interact with directly through finger strokes. This portable device can be used for browsing the Web, listening to music, watching movies, reading e-books and playing games, among other things

**Laptop-** A laptop is a computer designed for portability. Laptops are usually less than 3 inches thick, weigh less than 5 pounds and can be powered by a battery. As such laptops are designed for low power consumption and are most often used when space is limited, such as on an airplane. A laptop computer is also called a notebook.

**Likert Scale-** Likert Scale, rating system, used in questionnaires, that is designed to measure people's attitudes, opinions, or perceptions. Subjects choose from a range of possible responses to a specific question or statement; responses typically include "strongly agree," "agree," "neutral," "disagree," and "strongly disagree." Often, the categories of response are coded numerically, in which case the numerical values must be defined for that specific study, such as 1= strongly agree, 2= agree, and so on. The Likert scale is named for the American social scientist Rensis Likert, who devised the approach in 1932.

**Mobile Application-** A mobile application, most commonly referred to as an app, is a type of application software designed to run on a mobile device, such as a smartphone or tablet computer. Mobile applications frequently serve to provide users with similar services to those accessed on PCs. Apps are generally small, individual software units with limited function. This use of software has been popularized by Apple Inc. and its App Store, which sells thousands of applications for the iPhone, iPad and iPod Touch. A mobile application also may be known as an app, Web app, online app, iPhone app or smartphone app.

**Personal Computer Desktop-** A personal computer desktop is a general-purpose, cost-effective computer that is designed to be used by a single end-user. Every PC is dependent on microprocessor technology, which allows PC makers to set the entire central processing unit (CPU) on a single chip. Businesses make use of PCs to perform tasks like accounting, desktop publishing and word processing as well as to run database and spreadsheets. At home, PCs are mainly used for multimedia entertainment, playing PC games, accessing the Internet, etc. Even though PCs are intended to use as single-user systems, it is normal to connect them together to create a network, such as a local area network (LAN).

**Short Message Service (SMS)-** Short Message Service (SMS) is the most basic communications technology for mobile data transfer and is characterized by the exchange of short alphanumeric text messages between digital line and mobile devices. SMS messaging's key influential factor is affordability. SMS messages hold up to 140 bytes (1,120 bits) of data, which allows a 160-character alphanumeric message in the default 7-bit alphabet or a 70-character message in a non-Latin language, such as Chinese. SMS is also known as text messaging.

**Skype-** Skype is a voice over Internet Protocol (VoIP) software application used for voice, video and instant messaging communications. Skype software allows user to make calls, video calls or engage in chat over the Internet. Unlike other similar services, Skype calls use peer-to-peer technology rather than the client-server system. Skype to Skype calls are free, while public switched telephone network (PSTN) and mobile calls are either free or subject to certain fees. Registered Skype contact information may be included in the public Skype directory if this is authorized by users.

**Smartphone-** A smartphone is a mobile phone with highly advanced features. A typical smartphone has a high-resolution touch screen display, WiFi connectivity, Web browsing capabilities, and the ability to accept sophisticated applications. The majority of these devices run on any of these popular mobile operating systems: Android, Symbian, iOS, BlackBerry OS and Windows Mobile.

**SnapChat-** SnapChat is an application developed by Daniel Smith and his team at Stanford University that enables users to take pictures and record videos then, if desired, add captions to them and send them to selected individuals. SnapChat allows users to take pictures and videos called "snaps." Users can set a time limit, after which the picture or the video is removed from the SnapChat server and the recipient's device. This provides security for users who are concerned their images may be stored on the Internet or used without their permission.

**Social Constructivism-** In the application of Social Constructivism, the teacher and the social context of the classroom construct the boundaries in Piaget's cognitive theories of development. According to social constructivists, by contrast, learning and development are social, collaborative activities. Important role models, elements of culture, language, and other aspects of the learner's environment all greatly affect the making of meaning and the development of the learner's mental abilities. Thus, learning is a social, collaborative activity (Steiner 2014).

**Social Influence-** Social influence is defined as change in an individual's thoughts, feelings, attitudes, or behaviors that results from interaction with another individual or a group. Social influence is distinct from conformity, power, and authority.

**Social media-** Social media is a catch-all term for a variety of Internet applications that allow users to create content and interact with each other. This interaction can take many forms, but some common types include: sharing links to interesting content produced by third parties: public updates to a profile, including information on current activities and even location data; sharing photos, videos and posts; commenting on the photos, posts, updates, videos and links shared by others.

**Social Network-** Social network is defined as a chain of individuals and their personal connections. Expanding one's connections with other people is a technique that can be used both for personal or business reasons. Social networking applications make use of the associations between individuals to further facilitate the creation of new connections with other people. This could be used to meet new friends and connect with old ones, as many people do on Facebook, or to expand one's professional connections through a business network like LinkedIn.

**SurveyMonkey-** SurveyMonkey (surveymonkey.com) is possibly the most popular online survey tool available today. There are 15-plus question types, custom logo and branding; page, question, and skip logic are also possible. The free service gives users the possibility of creating a survey with up to 10 questions

**Tablet PC-** A tablet PC is a portable PC that is a hybrid between a personal digital assistant (PDA) and notebook PC. Equipped with a touch screen interface, a tablet PC usually has a software application used to run a virtual keyboard. However, many tablet PCs support external



keyboards. Tablet PCs have built-in Web browsing capabilities, multiple connectivity options, capacitive touch screens and multimedia - including high definition (HD) support. Tablet PCs are also equipped with accelerometers, which allow users to view display screens in portrait or landscape mode.

**Text Messaging-** Text messaging is the transfer of short messages between two or more fixed or mobile devices. Text messaging devices include mobile phones, pagers and personal digital assistants (PDAs). Text messaging originated with the short message service (SMS), which was derived from radiotelegraphy. Today, text messaging is a critical global communication medium.

**Tweet-** A tweet is a Twitter message displayed on a user's profile page, which is publicly visible by default, and shared with all his or her "followers." It can be described as a status update or post published by a Twitter user. Tweets are limited to 140 characters, including spaces, and may include URLs and hashtags.

**Twitter-** Twitter is a social networking and microblogging online service that allows users to send and receive text-based messages or posts of up to 140 characters called "tweets." After the online sign-up process, users can post their tweets by using a computer or other Twitter-compatible device such as a smartphone, and can view tweets posted by other "followed" users. Twitter is also referred to as the SMS of the Internet because of its unmatched popularity and its similarity to the SMS text messaging system used on cellphones. Twitter has been used to inform people about various TV events such as the Oscars, MTV Video Music Awards, etc. Because of this, Twitter is sometimes called the virtual watercooler or social television.

**YouTube-** YouTube is a popular video sharing website where registered users can upload and share videos with anyone able to access the site. These videos can also be embedded and shared on other sites. YouTube was developed by former PayPal employees in 2005 and was acquired by Google in 2006. It has had a profound impact on media and advertising. Most of the videos found on YouTube are created by amateurs, but some professional film makers also use the platform to share their work. Virtually all types and genres of videos are posted on the site, from sports accidents to homemade music videos. Copyrighted work also makes its way onto YouTube, which has raised many issues for companies that produce media for traditional outlets such as television.

**Web 2.0-** Web 2.0 is the name used to describe the second generation of the World Wide Web, where it moved static HTML pages to a more interactive and dynamic Web experience. Web 2.0 is focused on the ability for people to collaborate and share information online via social media, blogging and Web-based communities. Web 2.0 signaled a change in which the World Wide Web became an interactive experience between users and Web publishers, rather than the one-way conversation that had previously existed. It also represents a more populist version of the Web, where new tools made it possible for nearly anyone to contribute, regardless of their technical knowledge. Web 2.0 is pronounced web-two-point-o.

**WhatsApp-** WhatsApp Messenger is a cross-platform instant messaging application that allows iPhone, BlackBerry, Android, Windows Phone and Nokia smartphone users to exchange text, image, video and audio messages for free.

**Wiki-** A wiki is a website that allows the site visitors to add and edit content. Generally, site visitors use their browser to edit text without requiring HTML code. Additionally, some Wikis allow adding and editing of graphics, tables and interactive components. The term wiki may also simply refer to the software used to create such a Web site. A blog site, by contrast, does allow visitors to add content, but does not usually allow them to change or edit previous comments from others.

## **Appendix A**

Survey (Designed by Angel S Marquez Jr., thesis author)

Title: DIDACTICAL USE OF SOCIAL MEDIA: Exploring the Motivational Impacts of Utilizing Facebook on the Learning of Physics

Angel S. Marquez (Principal Investigator/TED5399\_Thesis Project)

- 1) What is your major?
- 2) What is your age group?
  - a) 18-24   b) 25-29   c) 30-36   d) 36-Up
- 3) What is your gender?
- 4) Do you have a Facebook account?
  - a) Yes   b) No
- 5) If you do have a Facebook account, how long have you had it?
- 6) If you do not have a Facebook account, do you have any other social media account? If you do have other social media of preference instead of Facebook, can you please name it?
- 7) On average, how much of your daily time do you spend logged into your Facebook account?
- 8) When you are logged into your Facebook account, do you do so mostly through a:
  - a) Cell phone   b) iPad   c) Tablet   d) Laptop   e) Computer desktop?

- 9) Are you logged into your Facebook account during any of your class lectures?
- a) Not at all    b) Rarely    c) Often    d) Always
- 10) What is your perception regarding your academic engagement being positively impacted if a Facebook account is created and used for a physics course like this one (Introductory Mechanics) as to enhance your active participation during the learning process, and every student, lab instructor, teaching assistant, and professor is included in such an account?
- a) Strongly Disagree    b) Disagree    c) Neutral    d) Agree    e) Strongly Agree
- 11) Do you perceive that your academic engagement may be positively affected if a Facebook account is the medium where the examination dates, content, and guidelines are posted?
- a) Strongly Disagree    b) Disagree    c) Neutral    d) Agree    e) Strongly Agree
- 12) Do you perceive that your academic engagement may be positively affected if a Facebook account has a hyperlink on its wall, directing you to the website where the homework assignments are submitted?
- a) Strongly Disagree    b) Disagree    c) Neutral    d) Agree    e) Strongly Agree
- 13) Do you perceive that your academic engagement may be positively affected if you and your classmates may post questions about class material on such a Facebook account's wall?
- a) Strongly Disagree    b) Disagree    c) Neutral    d) Agree    e) Strongly Agree
- 14) Do you perceive that your academic engagement may be positively affected if you and your classmates may create a post, requesting hints about particular homework assignments on such a Facebook account's wall?
- a) Strongly Disagree    b) Disagree    c) Neutral    d) Agree    e) Strongly Agree
- 15) Do you perceive that your academic engagement may be positively affected if such a Facebook account serves as the medium to create study groups for a physics course like this one (Introductory Mechanics)?
- a) Strongly Disagree    b) Disagree    c) Neutral    d) Agree    e) Strongly Agree

16) Do you perceive that your academic engagement may be positively affected if every student and professor is logged into such a Facebook account for the class during the lecture session, allowing for questions about class material to be posted and answered verbally by the professor or classmates?

a) Strongly Disagree   b) Disagree   c) Neutral   d) Agree   e) Strongly Agree

17) Do you perceive that your academic engagement may be positively affected if every student and professor is logged into such a class Facebook account during examinations, where questions, comments, and/or concerns are posted by students and answered verbally only by the professor?

a) Strongly Disagree   b) Disagree   c) Neutral   d) Agree   e) Strongly Agree

18) Do you perceive that your academic engagement may be positively affected if videos and simulations on physics concepts are posted or uploaded periodically on such a Facebook account's wall as to enhance the students' learning about the class material?

a) Strongly Disagree   b) Disagree   c) Neutral   d) Agree   e) Strongly Agree

19) Do you perceive that your academic engagement may be positively affected if such a Facebook account includes websites containing material which facilitates the learning of physics (introductory mechanical concepts)?

a) Strongly Disagree   b) Disagree   c) Neutral   d) Agree   e) Strongly Agree

20) Do you perceive that your academic engagement may be positively affected if a text message is sent through such a class Facebook account 24 hours before the homework assignments are due?

a) Strongly Disagree   b) Disagree   c) Neutral   d) Agree   e) Strongly Agree

21) Do you perceive that your academic engagement may be positively affected if a text message is sent through such a class Facebook account 24 hours before an examination is executed?

a) Strongly Disagree   b) Disagree   c) Neutral   d) Agree   e) Strongly Agree

22) Do you perceive that your academic engagement may be positively affected if study guides for examinations are posted on the Facebook account's wall?

a) Strongly Disagree   b) Disagree   c) Neutral   d) Agree   e) Strongly Agree

23) Describe your perception on the following scenario: through the Facebook account for the class, you are sent a text message containing a physical situation which illustrates the concepts covered in the next lecture. (Such a message will be sent a couple of hours before the class, and you will be asked to respond to one short question in regards to your reasoning on the nature of such physics principle.)

Elaborate on how this reminding and preparation modality, through the Facebook account for the class, may have an impact on your:

a) Academic engagement in this physics class (Introductory Mechanics)?

b) Attendance in this physics class (Introductory Mechanics)?

24) Describe your perception on the following scenario: through the Facebook account for the class, you are sent a text message containing the concepts and procedures covered during the next laboratory practice. (Such a text message will be sent a couple of hours before the lab session.)

Elaborate on how this reminding and preparation modality, through the Facebook account for the class, may have an impact on your:

a) Academic engagement in this physics (Introductory Mechanics) lab?

b) Attendance in this physics (Introductory Mechanics) lab?

25) Describe your perception on the following scenario: through the Facebook account's wall for the class, a practice exam will be posted? (The practice exam will be posted three days before the actual one, and through the Facebook wall, every student may ask the professor and classmates for hints on how to resolve such practice tests.)

Elaborate on how this reminding and preparation modality, through the Facebook account for the class, may have an impact on your academic engagement in this physics class (Introductory Mechanics)?

26) Elaborate on how your Facebook's level of accessibility and familiarity may have an impact on your academic engagement when such a Facebook account is utilized to mediate your learning process in a physics class like this one (Introductory Mechanics)? Alternatively, you may elaborate on your views about how your academic engagement may not be affected at all when such a Facebook account is utilized to mediate your learning process in a physics class like this one, regardless of the familiarity and accessibility factor?

27) Elaborate on how the interactive involvement and collaborative dynamism naturally emerging with this particular utilization of Facebook as the medium to manage the academic content of a physics class like this one (Introductory Mechanics) may have an impact on your academic engagement during the learning process? Alternatively, you may elaborate on your views about how your academic engagement may not be affected at all when such a Facebook account is utilized to mediate your learning process in a

physics class like this one, regardless of the interactive involvement and collaboration factors

- 28) Elaborate on your perception regarding how, through the Facebook account for a physics class like this one, the posting of questions by students about class material during the lecture session may have an impact on your class participation and academic engagement? (It is assumed that the professor will answer the posted questions in a prompt manner.) Alternatively, express your views about how your academic engagement and class participation may not be necessarily impacted by the above scenario?

And, how would you compare this modality of asking questions during the lecture session, through the Facebook account for the class, with the verbal modality of asking questions, as commonly exemplified by: raising your hand, and/or standing up for such a request?



## Appendix B

### Students' Written Responses to Open-Ended Questions (23 – 28) on the Survey Systematically Epitomized

23) *Describe your perception on the following scenario: through the Facebook account for the class, you are sent a text message containing a physical situation which illustrates the concepts covered in the next lecture. (Such a message will be sent a couple of hours before the class, and you will be asked to respond to one short question in regards to your reasoning on the nature of such physics principle.) Elaborate on how this reminding and preparation modality, through the Facebook account for the class, may have an impact on your academic engagement and attendance in this physics class (Introductory Mechanics)?*

- I will already have an idea of what we'll be taking about. Moreover, I would be more prepared.
- It would be a positive thing and another innovative resource
- It is a good way to introduce a concept and not waste time at beginning of class.
- The question should be sent up to 16-24 before class instead of only 2 hours before, since I have classes back to back.
- The question should not be graded since it is a new topic.
- There would be more engagement during class.
- I could start looking at it immediately.
- I would be able to ask questions about what I did not understand.
- Reminders and pointers would make the class easier to engage in.
- If I am required to participate with a response, then it will motivate to look at the material before class.
- Geologist do fieldwork that keep us from internet access some/most weekends.
- I would stay more up to date in any class material learned daily.
- It will help you achieve a better grade.
- Answering this type of question would bring excitement to my education.
- This system will encourage me to stay in constant practice of the class material, since most of the time I am connected to Facebook anyways.
- If the time of engaging in the assignment is short, I would like it. Making something too long on Facebook takes the attention away from me.
- I will be at least semi-prepared before class.
- It will help me to practice the topic more and develop a good habit.
- I check Facebook more than Blackboard, so this would be a benefit since I am always logged in Facebook.
- It would be easier to take attendance.

- It will remind me that I have class, and especially if the topic is something interesting and new, it will positively affect my attendance.
- I would attend the class to learn more.
- I would attend every lecture if this was to happen.
- It would be a good way to complement the lecture.
- No impact for me, I don't use Facebook.
- There will be more engagement however some students may not have access before class.
- It might not be of much help. I have classes before this one so I wouldn't use it.
- I don't find this text message necessary.
- If this were to be done, I think everything should be done through Blackboard and email.
- It will discourage students from staying (unnecessary).
- I wouldn't do it, more than likely.
- I wouldn't be having my personal Facebook with a class I am gonna take for only 6 months.
- I might feel inclined to not attend class if I knew the subject already.
- This message wouldn't impact my attendance since I barely miss class. A question wouldn't stop me from going to class and learn.
- If all these resources are in Facebook there would be a possibility that I will miss a little bit of classes.
- I am neutral about it.
- If question is for a grade, then it would affect my attendance.

24) *Describe your perception on the following scenario: through the Facebook account for the class, you are sent a text message containing the concepts and procedures covered during the next laboratory practice. (Such a text message will be sent a couple of hours before the lab session.)*

*Elaborate on how this reminding and preparation modality, through the Facebook account for the class, may have an impact on your academic engagement and attendance in this physics (Introductory Mechanics) lab?*

- This system wouldn't have an impact on my academic engagement for the lab, or my attendance.
- It will prepare me a lot better, especially for lab quizzes.
- It will feel more interested in attending because I know the subject after "brushing up" on the topic and more confident in applying the knowledge.
- Labs already have this sort of system in place with the pre-labs.
- It will help in reminding me to go to the labs.

- I will not like Facebook in the lab.
- I would go in prepared to ask questions about questions and procedures I didn't understand.
- Students can gauge their understanding of the material for that day.
- This would help me a lot because sometimes I don't know how to do the lab experiments.
- I will be finishing the lab experiment faster since I can do a background research in order to be prepared.
- I would have a good attendance because I'll be ready to complete the lab assignments.
- The labs would look a lot interesting.
- It would make labs easier to jump into quickly.
- There should be no one forgetting they have lab since way too many people are attached to their cell phones.
- I am neutral about it because the pre-lab assignments are enough to prepare us for labs.
- For the lab, I don't think it would make much of a difference since material are usually online before each session anyway.
- Attendance is already pretty mandatory, so a remainder wouldn't make much of a difference.
- This would be extremely helpful since sometimes the lab experiments deal with topics that we haven't yet covered in class.
- It won't affect because our grade depends on attendance anyway.
- I would enjoy it more since I would have Facebook to advise me on what will happen.
- I don't check Facebook often.

25) *Describe your perception on the following scenario: through the Facebook account's wall for the class, a practice exam will be posted? (The practice exam will be posted three days before the actual one, and through the Facebook wall, every student may ask the professor and classmates for hints on how to resolve such practice tests.) Elaborate on how this reminding and preparation modality, through the Facebook account for the class, may have an impact on your academic engagement in this physics class (Introductory Mechanics)?*

- I would start studying before the review day, thus the day of the review if I make a mistake I would notice.
- I wouldn't study.
- It would prepare us all; we all would be helping each other out.
- It will be easier to study.
- Reminding me would make a huge difference because I tend to forget.
- I will exceed on the exam
- I could follow up results from classmates and professor.
- This will create an efficient form of communication.
- Sounds like a good idea, but I wouldn't like getting constant notifications.

- It would be a great help especially if people can reply quick and accurately.
- I feel this should be done through Blackboard.
- 3 days before the actual exam seems too short of a time.
- Students will be getting high scores.
- I can get notified on my phone making it more accessible.
- We would be more motivated to study topics we lack on.
- I will be more incline to practice and participate.
- I could get feedback from professor faster.
- It will help reduce stress.
- Same as having the practice exam on Blackboard.
- People would be more comfortable in asking questions.
- Students will be tempted to be distracted.
- I hope it really happens.
- Good form of group studying.
- I wouldn't remember to check my Facebook.
- More guidance on the subject.
- It would be better that way you don't know their cell numbers.
- I will be more confident on the exam.
- I can compare answers with classmates.
- Facebook is much easier to access than Blackboard.
- It will be very helpful since you can chat and do many things on Facebook.
- I am neutral about it.
- I would manage my time better.
- I procrastinate often, so this would be very convenient.
- It will force me to look at the practice exam.

26) *Elaborate on how your Facebook's level of accessibility and familiarity may have an impact on your academic engagement when such a Facebook account is utilized to mediate your learning process in a physics class like this one (Introductory Mechanics)? Alternatively, you may elaborate on your views about how your academic engagement may not be affected at all when such a Facebook account is utilized to mediate your learning process in a physics class like this one, regardless of the familiarity and accessibility factor?*

- You get to engage with more people.
- I agree with accessibility but not with it being used in class.
- For me, I wouldn't make a difference since I am pretty familiar with Facebook.
- I don't think it would be too hard as for to learn how to use it.
- Familiarity and accessibility would help the engagement outside the class, but it may affect the learning process during lectures.
- It will make the communication easier.

- Familiarity and accessibility will help me get a better grade, since it would be easier to download files, and ask questions.
- I check Facebook anywhere.
- It would be easier to seek for help.
- It would be highly accessible, especially through my smartphone.
- If one has never use Facebook or can't access it, then it would be a problem.
- It is a great idea to take advantage of the fact that people are in their phones most of the time.
- You need to be very familiar with Facebook as for it to make an impact.
- I check Facebook every day and almost every hour.
- I would be using Facebook more than Blackboard.
- The fact that Facebook has been around for so long makes it easier to use for just about any group.
- I check Facebook more often than blackboard and my email.
- If someone isn't familiar with Facebook, they are at disadvantage.
- I don't know how to use Facebook.
- I use Facebook frequently, so I'll be studying an hour of physics every day.
- It could be potentially of benefit only for Facebook users.
- Facebook is less convenient than Blackboard.
- Facebook easy use means you can find and access material quickly.
- I would have to bring my laptop to class because using my phone would be very inconvenient.
- I would prefer to keep Facebook more leisure oriented and Blackboard for educational purposes.
- I don't have a Facebook account, but if there is one for this class, I would create one as well. It will be very helpful and beneficial.
- My parents don't allow me to use too much my cell phone, therefore this is bad for me.
- Facebook is too much of a distraction. I think social media and education should not be combined
- The professor makes the difference, not the level of accessibility.

27) *Elaborate on how the interactive involvement and collaborative dynamism naturally emerging with this particular utilization of Facebook as the medium to manage the academic content of a physics class like this one (Introductory Mechanics) may have an impact on your academic engagement during the learning process? Alternatively, you may elaborate on your views about how your academic engagement may not be affected at all when such a Facebook account is utilized to mediate your learning process in a physics class like this one, regardless of the interactive involvement and collaboration factors?*

- Students would probably have more resources and ways of studying.
- No impact.
- It could be a way to reinforce the lecture.
- For me, it'll be the same.
- It would help me, but also I think it will be weird knowing the whole class know my Facebook and other personal stuff.
- It will help students to keep track of lessons and be prepared for every class.
- It'll be helpful having all the material in Facebook, but I look for help in YouTube.
- The learning curve would increase for future classes that use this resource.
- Dynamism will surely be increased.
- Facebook will be a great tool for networking among peers if you need help on anything.
- As it stands, Blackboard doesn't affect my academic engagement, don't think Facebook would make a difference.
- Facebook interactivity is a crucial part of making this work, since when people need help, they need a quick response. This is a great way to have study groups and group discussions.
- Facebook should not be the medium.
- We will be more exposed to the subject.
- Since I am shy, being able to see others ask questions would encourage me to ask more questions.
- I like to learn by watching videos
- If someone posts a question, it could be useful for everyone in the class.
- I feel like something like that is needed, because what we cover in class and what we get for homework is different. So rather than wasting lecture time or solving questions, we would post it on Facebook and a discussion group.
- Engagement after class, more involvement with class and content.
- I may get distracted and go off surfing Facebook and the Web while I should be studying.
- I will be prepared or topics that will be covered in lecture.
- A Facebook page would highly positively impact my learning because I feel there would be a better structure to the class.
- Collaborating through Facebook will be really helpful, since I am an International student living in Ciudad Juarez, Mexico, it is hard for me to arrange physical meetings with professor and classmates.
- I'll be actively on the page helping others or asking for help.
- Managing content would definitely be easier.
- Communication through Facebook is much easier and faster.
- Because students are constantly on their phones, it makes complete sense to incorporate them into class time.
- There would be more interaction between students and professor.

- Having study material on Blackboard would be easier than having them on Facebook. Facebook doesn't have a simple way to file materials. Hashtags are too complicated, and I wouldn't like to search through a timeline.
- Students would feel more comfortable using a medium they're so familiar with.
- Facebook could be used to post important announcements.
- The "messenger" feature of Facebook allows us to communicate directly, however, it might be hard to follow the conversation since the whole class is talking.
- I see no impact due to lack of social media.
- Some students can't access such stuff.
- It would reinforce things being taught.
- My Facebook is private and making a second one just for this would be an inconvenience.
- As long as Facebook is not the only medium, I can see it functioning well.
- You have to take into account people like me that don't have Facebook. It would be nice to create a website where all students can access freely without having to sign into third party application. If this is done, then I agree that my academic engagement will be positively impacted.

28) *Elaborate on your perception regarding how, through the Facebook account for a physics class like this one, the posting of questions by students about class material during the lecture session may have an impact on your class participation and academic engagement? (It is assumed that the professor will answer the posted questions in a prompt manner.) Alternatively, express your views about how your academic engagement and class participation may not be necessarily impacted by the above scenario?*

- Sometimes many students have the same question, it is just that sometimes we can feel embarrassed of asking. It makes it less intimidating through Facebook I guess.
- People that are shy would ask questions without a problem, although people without an account would do poorly.
- It will help to solve questions you suddenly have.
- It's no big difference. I think the "old way" is better.
- I think it would be better raising your hand.
- Well, verbally, people get too shy or teacher doesn't see them.
- I think I might get too distracted looking at other things on Facebook.
- It would be a great source and would be better than hiring a tutor for questions you could just post on Facebook and get answers from peers, TA's, and the Professor.
- Verbal modality is good and gives the student a different relationship with professor.
- I like the idea, I just don't like Facebook for it. May be an app like 'Brads hot would be best.
- Facebook will have a great effect on participation, however, during lectures and exams, it will be disruptive.

- I think that the only people who will use it, it would be the students who are struggling, so it might not help much.
- Facebook would help by keeping those questions posted and if class finishes and the professor could not answer your question, he may answer after class through Facebook.
- The class participation will be low since everybody would be posting their doubts on Facebook, but still I like the idea.
- It is much easier to ask questions through Facebook, especially in a large class.
- This would allow students who can be heard to have their questions answered.
- I find that for a big class is hard to be noticed in. I took an astronomy class where the professor answered questions by txt message during the lecture- it was easier than shouting, and no one was ignored. It was great.
- Blackboard is there for such interactions.
- I am sure it would be helpful, such as an online social tutoring.
- It would require almost an immediate response for it to be effective.
- It would be fine as long as it is shown on the projection screen.
- I will improve my grade.
- My attendance would still be low unless there is a mandatory quiz.
- It will save sometime, and let professor answer the most important questions.
- It is a weird phenomena, but students used to be more active participants rather than in public. So thanks to this the amount of questions answered will be greater.
- The questions should go on point to the issue, but still remaining respect to the professor with manners.
- It encourage people to think and you get other people of think.
- Receiving answers through text may be no different than looking it up in the internet.
- Since we already check Facebook several times throughout the day, we don't have to be reminded to check other websites.
- It would be less noisy and confusing by FB than everyone trying to speak at once.
- Asking questions may help some students, but I am a visual learner and slow one so reading alone does not help me. Perhaps if the professor makes a YouTube channel.
- I feel like students rather type a question than ask because you have a chance to formulate your question, and make sure you have all the information correct before asking.
- To me, this is the only place where this idea fails, since this is not a hybrid class.
- I will neutral and still not participate, but I will listen.
- It's quicker using your body.



## Vita

The Thesis author's name is Angel S. Marquez Jr. His elementary and secondary education was consummated in the border region of Ciudad Juarez, Chihuahua, Mexico. At the age of sixteen, he immigrated to study in El Paso, TX, where he graduated from David L. Carrasco Job Corps Center; he completed an associate degree in pre-engineering at El Paso Community College; he obtained a bachelor of science degree in mathematics from the University of Texas at El Paso (UTEP); he accomplished a Masters of Art in Teaching physics degree from UTEP; additionally, he is expecting to be awarded with a Masters of Art in Education degree.

His scholarly archetypes pertaining to pedagogical endeavors revolve around indigenous struggles and pedagogies, critical social theories, the perpetual legacy of colonization, color-blind racism, gender equity, consumerism in capitalistic social structures, inadequacy of standardized assessments, critical media literacy, racism within Latin America, and culturally-relevant curriculum designs. Moreover, his research interests in science education involve the infusion of digital technologies into college level science academic curricula, as to address the needs of millennial generation of students. Furthermore, his future academic studies will be delineated by higher educational institutions' policy designs and educational agendas pertaining to the recruitment and retention of women and other historically underrepresented populations in the science, technology, engineering, and mathematics (STEM) fields within the El Paso, TX border region.

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This thesis was typed by Angel S. Marquez Jr.